

THE WADI TUMILAT AND THE “CANAL OF THE PHARAOHS”

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THE existence of an ancient canal, the so-called Canal of the Pharaohs, that once linked the Nile to the Red Sea by way of the Wadi Tumilat has been known for some time. Beginning with Napoleon Bonaparte and the French Expedition at the end of the eighteenth century, modern European scholars, travelers, and explorers consistently reported the preservation of long expanses of ancient canal spoil banks extending through the Wadi Tumilat to the edge of the Isthmus of Suez, and from there south to Suez and the Red Sea. Indeed, virtually every visitor who wrote on the region during the nineteenth and early twentieth centuries specifically mentioned an ancient canal. Unfortunately, only a few scattered fragments of these once impressive canal banks remain today.

The documentary history of the ancient waterway through the Wadi Tumilat is fairly extensive, and the canal is mentioned in a number of ancient as well as modern texts. In addition, several archaeological surveys and excavations in the Wadi Tumilat have shed further light on the canal's history. A reexamination of currently available documentation, written and archaeological, indicates that the history and development of the ancient canal are more complex than generally assumed.

Ancient Textual Evidence

There is a fairly extensive body of ancient texts that mentions a canal through the Wadi Tumilat.¹ The earliest of this material dates to the first era of Persian control over ancient Egypt, the latest to Islamic times. Some of the sources provide more detail than others. Unfortunately, the information contained in these texts is far from consistent, and the ancient records have sown almost as much confusion as they have shed light. The relevant major sources are summarized below in chronological order.

1. **Four stelae were erected by Darius I** (521–486 B.C.) to commemorate the excavation of a canal to the Red Sea.² These stelae were placed on high points in the terrain so

¹ This material has been discussed in detail by C. Bourdon, *Anciens canaux, anciens sites et ports de Suez*, Mémoires de la Société Royale de Géographie d'Égypte, vol. 7 (Cairo, 1925); J. Ball, *Egypt in the Classical Geographers* (Cairo, 1942); C. Küthmann, “Die Ostgrenze Ägyptens” (Ph.D. diss., Friedrich-Wilhelms-Universität, Berlin, 1911); and G. Posener, *Première domination perse en Égypte*, Bibliothèque d'Étude 11 (Cairo, 1936).

[JNES 54 no. 2 (1995)]
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0022-2968/95/5402-0003\$1.00.

² Posener, *Première domination perse*, pp. 48–87, 180 ff.; idem, “Le canal du Nil à la Mer Rouge avant les Ptolémées,” *Chron. d'Égypte* 25 (1938): 271 ff. A. Servin, “Stèles de l'Isthme de Suez: I. Stèles persanes,” *Bulletin de la Société d'Études Historiques et Géographiques de l'Isthme de Suez* 3 (1949–50): 75–98, also discusses this material and arrives at the singular conclusions that (1) the stelae were totally unrelated to the ancient canal; (2) the canal was constructed to permit the bringing of offerings by boat to sanctuaries in the Bitter Lakes because (3) the Bitter Lakes were regarded as the mystical source of the flood for lower Egypt.

that they could be seen by boats following the canal. The westernmost of the stelae was discovered at Tell al-Maskhuta; the next was found at the “Serapeum”³ of the French Expedition, located where the Wadi Tumilat merges with the Isthmus of Suez; a third lay in the region of Kabret in the Isthmus of Suez; and the last stela, now lost, seems to have been found 6 km north of Suez. One face of each stela was engraved with hieroglyphs; the other was carved in cuneiform (Persian, Elamite, and Babylonian). The cuneiform texts provide no details on the cutting of the canal. These are given by the hieroglyphs, which unfortunately are poorly preserved, full of lacunae, and difficult to interpret. G. Posener suggests that the four stelae marked the sections of the canal excavated by Darius.⁴

2. **Herodotus** (*Histories* 2.158 ff.), who visited Egypt in the mid-fifth century B.C., is the first classical author to mention explicitly the existence of a canal connecting the Nile River to the Red Sea. He records that Necho II was the first to attempt the excavation of such a canal to the Red Sea, but that he abandoned the project after 120,000 Egyptians died and after an oracle informed him only foreigners would profit from his labors. The canal was subsequently completed by Darius. According to Herodotus, the ancient canal left the Pelusiac branch of the Nile a little above Bubastis and arrived at the Erythraean Sea after passing near Patoumos, a city of Arabia. Part of the course of the canal traversed a narrow gorge oriented in an east-west direction (presumably the Wadi Tumilat), after which the channel turned southward to the Arabian Gulf. It took four days to traverse the waterway, which was large enough for two triremes to pass side by side.⁵

3. **Aristotle** (*Meteorology* 1.15), writing in the mid-fourth century B.C., indicates that “Sesostris” was the first to begin a canal crossing the Isthmus to the Erythraean Sea. Sesostris, however, like Darius afterwards, discovered that the level of the land was lower than that of the sea, and neither ruler completed the passage in order to avoid corrupting the waters of the Nile with those of the Sea.⁶

4. **Ptolemy II** Philadelphus (285 B.C.–246 B.C.) recorded the cutting of a canal through the Wadi Tumilat in the text of the so-called Pithom Stela. This commemorative stela, unearthed by Naville at Tell al-Maskhuta,⁷ was apparently erected at the site by Ptolemy II and commemorated a number of Ptolemy’s achievements.

³ “Serapeum” is a misnomer, as was pointed out as early as the 1870s by Linant de Bellefonds, in *Mémoires sur les principaux travaux d'utilité publique exécutés en Egypte depuis la plus haute antiquité jusqu'à nos jours* (Paris, 1872–73), pp. 128, 171 (see also J. Clédat, “Notes sur l'Isthme de Suez,” *BIFAO* 23 [1925]: 48). The site was so named because French Expedition members mistook the remains for the Serapeum mentioned in the Antonine Itinerary. The site was excavated in 1884 by C. Clermont-Ganneau, and the pieces of the stela were sent to the Louvre in 1886 and lost two years later. The area still preserves the name Serapeum in a modern village. See Posener, *Première domination perse*, p. 48, n. 3.

⁴ Posener, *Première domination perse*, pp. 272 f.

⁵ Ball, *Egypt in the Classical Geographers*, pp. 10–28. As J. S. Holladay, *Tell el-Maskhuta*, Cities of

the Delta, pt. 3 (Malibu, 1982), p. 2, points out, this implies a width in excess of 40 meters which compares favorably with the Maritime Suez Canal’s minimum original width of 60 meters.

⁶ Bourdon, *Anciens canaux*, p. 2.

⁷ E. Naville, *The Store-city of Pithom and the Route of the Exodus*, EEF Memoir 3 (London, 1888), pp. 18 ff., 24 ff.; A. B. Kamal, *Stèles ptolémaïques et romaines*, 2 vols. (Cairo, 1905), pp. 171–77, pl. 57, CG no. 22183. Naville called the large stela (1.28 meters high and almost 1 meter wide) the “Pithom Stela” on the basis of his conviction that at Tell al-Maskhuta he had discovered the site of biblical Pithom. Pithom is derived from Egyptian *Pr-³Itm*, the house/temple of Atum. The document is difficult and problematic and has never been satisfactorily published completely.

5. **Diodorus** Siculus visited Egypt in 59 B.C. and tells of an artificial canal running from the Pelusiac branch of the Nile to the Arabian Gulf. He recounts that this waterway was begun by Necho and continued by Darius, who left it unfinished because he was told the Red Sea was at a higher level than Egypt and would flood the land. The canal was completed finally by Ptolemy II who provided it with a lock. Diodorus Siculus also records that the canal was known as the River of Ptolemy and that the town of Arsinoë was found at its mouth.⁸

6. **Strabo** traveled through Egypt in 25–24 B.C. He records that Sesostris was the first king to begin the canal, followed by Necho who died before the canal was finished. Later Darius continued the waterway, but stopped when he was told the Erythrean Sea was at a higher level than Egypt and would submerge the land. The canal was finally finished by the Ptolemies who also fitted it with a lock. According to Strabo, the canal was 100 cubits (46 meters) wide and of sufficient depth to float large ships. It began at the village of Phacusa (which implies a change of off-take for the canal between Herodotus and Strabo) and traversed the Bitter Lakes, emptying into the Erythrean Sea or Gulf of Arabia near the city of Arsinoë/Cleopatis.⁹

7. **Pliny** the Elder, who wrote his *Natural History* in the first century A.D., implies that up to his time (first century A.D.) the canal was never completed.¹⁰ He records that Sesostris, and after him Darius, had contemplated cutting the canal, but work was only finally undertaken by Ptolemy II. After excavating a channel 100 feet wide and 40 feet deep for a distance of 37.5 roman miles as far as the Bitter Springs, Ptolemy stopped when he found the level of the Red Sea was three cubits higher than the land of Egypt. He feared either that the land would be inundated or that the water quality of the Nile would be ruined by mixing with sea water. Pliny also differs from other writers by placing the point where the canal entered the Red Sea at the Port of the Danaï. Pliny, however, also mentions a “River of Ptolemy” flowing past Arsinoë, so the Port of the Danaï may simply be another name for Arsinoë.

8. The Alexandrian astronomer and geographer **Claudius Ptolemaeus**, or Ptolemy, wrote in the second century A.D. He calls the canal from the Nile to the Red Sea the “River of Trajan” and indicates that in his day it started from the main Nile stream above the city of Babylon. Ball suggests that this change in off-take was probably made in the time of Trajan (A.D. 98–117) to secure a better flow of water by providing a more rapid slope.¹¹

9. **Lucien**, a public official in Egypt under the Antonines about A.D. 170, mentions a voyager who traveled by canal from Alexander to Clysma at the Gulf of Suez.¹² This is the last known reference to a functional canal through the Wadi Tumilat in the Roman period.

10. Finally, there are a number of **Islamic authors** who refer to the canal.¹³ As the reports are in fundamental agreement concerning the course of the canal and the dates of

⁸ Ball, *Egypt in the Classical Geographers*, pp. 46, 48 f.; see also Bourdon, *Anciens canaux*, pp. 2 f.

⁹ Bourdon, *Anciens canaux*, pp. 31 ff.; Ball, *Egypt in the Classical Geographers*, pp. 57 ff.

¹⁰ Bourdon, *Anciens canaux*, pp. 31 f.; Ball, *Egypt in the Classical Geographers*, pp. 82 ff.

¹¹ Ball, *Egypt in the Classical Geographers*, p. 130.

¹² Bourdon, *Anciens canaux*, pp. 31 ff.; Ball, *Egypt in the Classical Geographers*, p. 4.

¹³ Bourdon, *Anciens canaux*, 6 ff., 73 ff.; O. Tausson, *La géographie de l’Égypte à l’époque arabe*, Vol. 1 (Cairo, 1926), pp. 128 f. Brief references to the canal

its reopening and closing, only a summary of the sources is presented here. The gist of these accounts is that Trajan's canal had completely silted up by the mid-seventh century A.D. ³Amr Ibn ben As, the conqueror and Governor of Egypt, reopened the canal in A.D. 641 or 642, and the canal remained navigable and open until A.D. 767, when it was closed by order of the second Abbasid Caliph, Abu Jafr al-Mansur, who wanted to prevent supplies from reaching the rebellious cities of Mecca and Medina.¹⁴

Unfortunately, the above accounts are somewhat contradictory. For example, Herodotus reports that the canal was begun by Necho and finished by Darius. Diodorus Siculus says the canal was begun by Necho, worked on by Darius, and only finished by Ptolemy. Aristotle says the canal was attempted by both Sesostris and Darius, but neither finished it. Pliny implies the canal was still unfinished in his time.

Ethnographic Testimony

Most modern scholarly discussions of the ancient canal assume that although the point of origin of the canal may have varied, that portion of the waterway running through the Wadi Tumilat and the Isthmus of Suez had a single, unchanging course throughout antiquity. Detailed study of the available ethnographic and archaeological data indicates, however, that, at least in the western portion of the Wadi, there were two canals, not one. The first canal hugged the northern perimeter of the Wadi; the second ran along the valley's southern fringe.

All of the relevant modern sources agree that when Muhammad Ali initiated his agricultural development project in the western part of the Wadi in the early nineteenth century, he reexcavated an ancient canal running along the northern edge of the valley as far east as Ras al-Wadi.¹⁵ It is generally assumed that the French Expedition found only this northern canal. Since the Expedition's measuring stations followed the northern canal for a considerable distance, it is not surprising that this waterway receives extended treatment in the *Description de l'Égypte*. There is, however, also a brief mention by the French Expedition of a second canal through the western portion of the Wadi that joined the first at Ras al-Wadi, "dont on retrouve des vestiges assez étendus, au sud, et au pied des dunes de la vallée."¹⁶

This second canal ran along the southern edge of the valley. The two canals apparently merged in the vicinity of Tell al-Retabah (located at Ras al-Wadi). Both the northern and the southern canals have been characterized as *the ancient canal* through the

are also occasionally found in accounts of Christian authors dating between the sixth and the eighth centuries A.D.; see Bourdon, *Anciens canaux*, pp. 4 ff.

¹⁴ C. W. Hallberg, *The Suez Canal: Its History and Diplomatic Importance* (New York, 1931), p. 32; A. J. Butler, *The Arab Conquest of Egypt and the Last Thirty Years of the Roman Dominion* (Oxford, 1902), p. 227.

¹⁵ This canal is now incorporated into the present-day Ismailia Canal (*Travaux de la Brigade Française, rapport de l'ingénieur*, Société d'Études de l'Isthme de Suez [Paris, 1847], p. 89; A. Lucas, *A Report on*

the Soil and Water of the Wadi Tumilat Lands under Reclamation [Cairo, 1903], p. 7). For detailed descriptions of the course and nature of the remains of the ancient northern canal, see especially, J. M. Le Père, "Mémoire sur la communication de la Mer des Indes à la Méditerranée par la Mer Rouge et l'Isthme de Soueys," in *Description de l'Égypte*, vol. 11 (Paris, 1829), pp. 63 f., 116 f.; *Travaux de la Brigade Française*, pp. 88 ff.; Bellefonds, *Principaux travaux*, pp. 126 ff.; Bourdon, *Anciens canaux* and Clédat, "Notes" (*BIFAO* 23), pp. 63 f.

¹⁶ Le Père, "Mémoire sur la communication," p. 118.

Wadi by various scholars, most of whom seem to be unaware of or ignore the existence of a second canal bed. Thus, for example, Posener traces the route of the major ancient canal along the northern edge of the Wadi, Bourdon along the southern.¹⁷

Linant de Bellefonds is unequivocal on the subject of the two canals and describes them in useful detail:¹⁸

Il y a plus de quarante années que l'on voyait, dans la partie septentrionale de l'Ouadée Toumilat d'aujourd'hui, les restes d'un ancien canal qui avait eu de faibles dimensions; il venait de l'Ouest et courait à l'Est le long du désert et des terres cultivées; il n'était visible que depuis les environs d'Abou-Ahmed et jusqu'aux ruines de Tel-Retabé. . . . Au près de Tel-Retabé, ce canal en rencontrait un autre beaucoup plus large, à l'endroit nommé Ras-el-Ouadée . . . c'était le principal ancien canal . . . ces berges . . . courent dans les sables en traversant la digue d'Abascé ou de Méhémet-Ali . . . ensuite le canal longe les dunes de sable sous lesquelles il a disparu pour ainsi dire depuis trente-cinq années . . . elles reparaissent sous les grandes dunes d'Abou-Néshabé, et sont parfaitement à découvert jusqu'à Ras-el-Ouadée. . . . C'est là que l'autre canal de la partie nord venait rejoindre celui-ci, qui est bien plus considérable et présente l'aspect d'un très-ancien canal bien exécuté. . . . La partie de ce canal qui depuis la digue d'Abou-Ahmed va le long du désert et des terres cultivées de la partie nord de l'Ouadée jusqu'à Ras-el-Ouadée, est également un ancien canal qui a été creusé à nouveau par ordre de Méhémet-Ali; mais il avait toujours de faibles proportions et bien moindres en tout cas que celles du canal qui traversait la partie méridionale.

The two canals thus appear to have been very different. The northern canal was built on a smaller scale and only extended as far as Tell al-Retabah. Its impressive southern counterpart was larger and better made and ran the length of the Wadi; presumably it would have been the major canal through the region. This southern canal is also mentioned in the British Army map of the Wadi dating to 1888, which noted, already at that date, that the canal had been engulfed almost completely by the advancing line of sand dunes that flanks the Wadi Tumilat to the south.

There are also remains of a third waterway in the region, just outside the Wadi proper, which seems first to have been noted by Bellefonds.¹⁹ This sizeable canal,²⁰ with a remarkable elevation of 14 meters above sea level, began just north of Ismailia and extended to the northwest as far as the beginnings of Lake Manzaleh. J. Clédât²¹ was of the opinion that it originally crossed Lake Timsah and joined the "Canal of the Pharaohs" where the latter emerged from the Wadi Tumilat. A. Shafei²² and M. Bietak²³, however, have pointed out that, given its elevation and location, this third canal could never have been functional.²⁴

¹⁷ Posener, *Première domination perse*; Bourdon, *Anciens canaux*, p. 28.

¹⁸ Bellefonds, *Principaux travaux*, pp. 126 ff.

¹⁹ *Ibid.*, pp. 116, 125.

²⁰ Its spoil banks were 40 meters wide, and the distance between the two banks was between 80 and 100 meters.

²¹ Clédât, "Notes sur l'Isthme de Suez," *BIFAO* 23 (1924): 54.

²² A. Shafei, "Historical Notes on the Pelusiac Branch, the Red Sea Canal, and the Route of the Exodus," *Bulletin de la Société Française d'Égyptologie*, Paris 31 (1943): 242 ff.

²³ M. Bietak, *Tell el-Dab^a II* (Vienna, 1975), p. 138.

²⁴ It has also been suggested that another large artificial waterway, running between al-Qantarah and Pelusium, comprised part of an "Eastern Canal" that connected up with this third canal and the canal through the Wadi Tumilat (A. Sneh, T. Weissbrod, and I. Perath, "Evidence for an Ancient Egyptian Frontier Canal," *Amer. Scientist* 63 [1975]: 542-48). Bietak (*Dab^a II*, p. 139), however, and K. W. Butzer (*Early Hydraulic Civilization in Egypt* [Chicago, 1976], p. 46, n. 2; Kanal, "Nil—Rotes Meer," *LÄ*, vol. 3, p. 312) have pointed out that the watercourse between al-Qantarah and Pelusium most probably joined the upper Pelusiac branch near Kom Dafana, rather than the canal through the Wadi Tumilat. This position is also supported by Holladay (*Maskhuta*, pp. 2 f.,

Archaeological Evidence

Unfortunately, physical remains of the ancient canals in the Wadi Tumilat, once plentiful, are now scarce, as these have been consumed by agricultural development or buried by the all-engulfing sand dunes. As noted above, the current Ismailiah canal has taken over the bed of the ancient northern canal. A 1983 archaeological survey of the Wadi Tumilat²⁵ found other canal spoil bank remains in only four areas of the valley: **Gezirat al-Khadra** (Site 44), located along the southern edge of the western part of the Wadi; **Birket Um Qadah** (Site 59) and **Shaykh Salim** (Site 64), both found on the southern fringe of the central portion of the Wadi; and **Tell al-Gamalayn** (Site 28), situated in the eastern portion of the Wadi. The canal remnants at Sites 44, 59, and 28 were largely buried and not easily distinguishable from the surrounding ground surface. Only the high banks located at Site 64, Shaykh Salim, found in the middle of the central part of the Wadi, provided a modern-day witness to the original impressive scope of the canal.

Site 64 consisted of the clearly distinguishable and impressive remains of two parallel canal banks that were visible for approximately 200 meters. Part of the remains lay under a modern Islamic cemetery, undoubtedly a factor in their preservation. Although the cemetery and the immediate areas of the canal had a terrain of bare earth, cultivated fields were very close by. The two spoil banks, formed of a hard-packed mud material, were oriented in an east-west direction, and were approximately 30 meters wide and 80 meters apart. They have been badly disturbed and are slowly disappearing, doubtless being used as fertilizer for the nearby fields. Much of the western portion of the southern bank has been dug out, and the western end of the northern bank is completely gone. Tip lines are clearly visible in several places where the bank has been disturbed. No potsherds or other objects were recovered from the area. Bellefonds²⁶ recorded that from Ras al-Wadi the ancient canal went directly to the east, and that at "Chek Selim," or Shaykh Salim, its banks were particularly high.

None of the canal banks has ever been excavated, so direct archaeological evidence for dating is not available. The general archaeological findings of the 1983 survey, however, do provide inferential evidence for dating at least the southern canal.²⁷ In particular, the location near the watercourse of two significant tell sites, **Tell al-Shaqafiya** and **Tell al-Gebel**, both of which produced numerous imported amphorae sherds, suggests a correlation between the dates of these sites and of the canal. Shaqafiya is one of the largest tells in the Wadi and was clearly a local center of some importance. Its position has no particular defensive advantage (unlike the locations of Retabah and Maskhuta, the two other large tells in the valley), and it seems likely that the site was founded as an **emporium and entrepôt for the canal trade** at the western entrance to the Wadi.

n. 4). Moreover, as already noted, the canal north of Ismailiah was probably never operational.

²⁵ Financial support for the survey was provided by the Edward L. Ryerson Fellowship in Archaeology of the University of Chicago, the American Research Center in Egypt, and an Endowment for Biblical Research Travel Grant. Survey Personnel consisted of the following: J. S. Holladay, Jr., Co-Director; I was Co-Director and Field Director; and Renée Friedman,

Edward F. Banning, Cesare d'Annabile, and Bryant Wood, field staff. For more details and the results of the survey, see my "On an Egyptian/Asiatic Frontier: An Archaeological History of the Wadi Tumilat" (Ph.D. diss., University of Chicago, 1989).

²⁶ Bellefonds, *Principaux travaux*, p. 127.

²⁷ See my "Egyptian/Asiatic Frontier," pp. 119 ff., 141 f., 209 ff.

Gebel, a smaller site, could have served as an auxiliary depot of some sort. Both Shaqafiyah and Gebel appear to have been occupied from Persian through Late Roman times. The concentration of settlement remains found by the survey along the southern flank of the Wadi is also consistent with the location of a major canal in this area.

Discussion

The ancient textual evidence, particularly that of the classical authors, is hopelessly contradictory and can only be used cautiously as a primary historical source. It is possible, even likely, that part (but by no means all) of the confusion concerning the canal in these texts is due to two factors: (1) in some cases rulers were not excavating a canal *de novo* but, rather, were digging out previously completed works; and (2) some of the canal references may refer to abortive attempts to bisect directly the Isthmus of Suez in order to connect the Mediterranean and Red Seas, rather than to the canal through the Wadi Tumilat. Thus, for example, Shafei, followed by Bietak, identifies the spoil banks north of Ismailia with Ptolemy's unsuccessful direct canal attempts.²⁸

Ethnographic testimony, combined with archaeological evidence, clearly indicates that there were at least two ancient canals in the Wadi Tumilat, particularly in its western portion. The question then arises: what is the relationship between these two canals? There are several possible alternatives: (1) the northern canal was earlier than the southern canal and ran only as far as Tell al-Retabah (Ras al-Wadi); (2) the northern canal was earlier than the southern canal but ran the entire length of the Wadi, and the later builders of the southern canal simply recut the eastern part of the canal on a larger scale; or (3) the northern canal was a later addition, necessitated by a change in waterflow patterns, which was connected to the earlier southern canal at Tell al-Retabah.

The third alternative can be eliminated almost immediately. Assuming continuity of the canal location from Persian to Roman times, which is supported by the archaeological evidence, a later northern canal would have had to have been built in Islamic times. Arab tradition, however, records specifically that the early caliphs merely dug out the extant but silted up Roman channel; this reconstituted canal went out of use in the mid-eighth century A.D. After this time, there is not a shred of evidence, from any source, indicating work on or use of a waterway in the Wadi Tumilat until Muhammad Ali inaugurated the Wadi canal in the early twentieth century.

Either of the first two explanations is possible. It is conceivable that an original Saite canal through all or part of the valley ran along the northern edge of the western Wadi division and then eventually failed due to changes in the water regime outside the Wadi. Archaeological evidence of settled occupation in the Saite period is confined to Tell al-Maskhuta and, early in the period, Tell al-Retabah; it could be significant that the settlement sites along the southern rim of the valley do not appear to be inhabited at this point.

Alternatively, it is noteworthy that several classical and Muslim authors record a tradition that "Sesostris" was the first to build a canal through the Wadi Tumilat. While this tradition cannot be taken at face value, as by classical times a composite Sesostris had acquired semi-legendary status and exploits to match, it could, in fact, signal the

²⁸ Shafei, "Historical Notes," p. 242; Bietak, *Dab²a II*, p. 137.

existence of a much earlier canal. Taking into account the twin requirements for canal construction and maintenance of strong and dynamic central government and high Nile floods (see below), two periods stand out as the most likely candidates for an early canal: the earlier Middle Kingdom and the New Kingdom under Ramses II.

Given these two choices, the weight of currently available evidence would appear to support a New Kingdom date for such a watercourse. The 1983 survey indicated that evidence for Middle Kingdom occupation in the Wadi is minimal at best. On the other hand, Ramses II seems to have undertaken monumental building activities at Tell al-Retabah, and a water channel certainly would have aided in bringing material and supplies to a permanent outpost at the site.²⁹ It is doubtful, however, that this New Kingdom canal—if it existed—would have extended beyond Tell al-Retabah. At this time, the central and eastern portions of the Wadi, as well as the adjacent Isthmus of Suez, appear to have had very limited occupation, and the labor and other costs of building and maintaining a canal through this area would have far outweighed any benefits. Ramses II had much better things to do with his resources. It is also possible that the technology needed for extending an operational canal through the Wadi and beyond was not available at this time.

Although direct data are not available, it appears unlikely that any ancient canal through the Wadi Tumilat would have been operational year-round. Waterflow through the Wadi was subject to considerable short-term variation, and it is suggestive that the periods when the canal was functional seem to coincide with high Nile regimes.³⁰ Even elevated flood levels, however, probably would have been sufficient only to maintain adequate water depth for travel during part of the year. A. B. Clot³¹ notes that in his time the Nile itself from Cairo to Alexandria, to Damietta, and to Rosetta was only navigable by large barques for six months of the year. The 1847 engineer's report of the French Brigade³² suggests that navigation through the Isthmus of Suez in antiquity would have had to be suspended for the summer months. The ancient waterway from Babylon to Bubastis was usable at high Nile alone.³³ Similarly, prior to successful completion of the modern barrages, even the Wadi canal, designed as a perennial *sefi* canal, was dry or almost dry during low water.³⁴

The magnitude of the planning, technical skill, and labor involved in the excavation, and, equally important, the constant maintenance of a large-scale navigation canal should not be underestimated. This is especially true when, as with the Wadi Tumilat, one is dealing with a thinly populated area of variable elevation that is circumscribed by a nearby desert terrain with its omnipresent choking sands. Muhammad Ali used a *corvée* of 80,000 *fellahin* to excavate his Wadi Canal. Bellefonds³⁵ records that cleaning of the large *sefi* canal of Khatatbe in Behera Province required the efforts of 30,000 workers for at least 40 days; in the whole province, however, there were only between 12,000 and 15,000 men, and the remainder had to be brought in from neighboring areas. Even considering that these two nineteenth century canals were perennial and therefore may have required a somewhat greater amount of labor than the ancient waterway, the crea-

²⁹ Bietak, *Dab²a II*, pp. 89 f.

³⁰ Redmount, "Egyptian/Asiatic Frontier," pp. 18 ff.

³¹ A. B. Clot, *Aperçu général sur l'Égypte* (Paris, 1840), p. 495.

³² *Travaux de la Brigade Française*, p. 99.

³³ Butler, *Arab Conquest*, p. 347.

³⁴ M. J. Hawkshaw, *Rapport de M. J. Hawkshaw sur les Travaux du Canal de Suez* (Paris, 1863), p. 24.

³⁵ Bellefonds, *Principaux travaux*, pp. 42 f.

tion and upkeep of the latter canal would have required tremendous human resources.³⁶ Only an aggressively strong and committed central government would have been capable of the herculean planning and labor mobilization needed for such an endeavor.

Conclusions

Combining the various sources of evidence for the ancient canal, it seems probable that the first major trade canal through the Wadi, the southern canal, was cut by Necho II with a point of off-take in the Delta west of the Wadi Tumilat. There also may have possibly been an earlier, limited-use water channel extending as far east as Tell al-Retabah. The southern trade canal extended at least as far east as Tell al-Maskhuta and possibly all the way to the Red Sea.³⁷ At some subsequent point, the waterway silted up and had to be re-excavated by Darius I; or, alternatively, Darius completed the section of the canal from Tell al-Maskhuta to the Red Sea. The canal had to be cleaned out once more under Ptolemy II. By Roman times there appears to have been a substantial change in waterflow patterns in the eastern Delta, and under Trajan the point of origin of the canal was moved south to Babylon (Old Cairo). At some point after A.D. 170, the canal went out of use again, only to be reexcavated once more along its Roman lines after the Arab conquest in the seventh century. It was purposely blocked in the mid-eighth century A.D., after which it lay abandoned until it was given a new lease on life in the nineteenth and twentieth centuries A.D.

³⁶ Herodotus records that 120,000 Egyptians died building Necho's canal; even if the number is exaggerated, as it undoubtedly is, the amount of labor implied by the figure is comparable to that for the *sefi* canals. Various modern researchers have recorded dimensions of the ancient canal remains, taken mostly in the region between Lake Timsah and Suez, as follows: 30 meters from one canal bank to the other (Bellefonds, *Principaux travaux*, p. 127); a width of 160 to 200 feet for the canal bed and banks 15 to 20 feet high (J. B. Sainte-Hilaire, *Egypt and the Great Suez Canal*

[London, 1857], p. 314); a width at the waterline of 35 to 40 meters (Le Père, "Mémoire sur la communication," p. 67). In addition, Le Père (*ibid.*, p. 116) also noted that the remains of the canal banks near Tell al-Maskhuta were spaced 30 to 40 *toises* (approximately 30 to 40 meters) apart.

³⁷ The question of the canal and the canal trade at Tell al-Maskhuta is currently being investigated by Patricia Paice in a doctoral dissertation at the University of Toronto.