Introduction

Arthur Boak was one of the most esteemed scholars in the history of the University of Michigan, the host institution of the 25th International Congress of Papyrology. In discussing the history of the end of the Roman Fayum, Boak stressed the role of a decaying irrigation system in the abandonment of towns:

Dimai, the ancient Soknopaiou Nesos, lying to the north of the Birket Qârûn, was not reoccupied after the decline of the third century. Theadelphia and its neighbor towns in the northwestern corner of the Faiyûm were abandoned in the course of the fourth century. Philadelphia and Bacchias, which probably depended upon the same high level canal as Karanis, seem to have fallen into decay at about the same time. With the failure of the border canals, the cultivated area shrank until it was restricted to the old Nile alluvial deposit in the central part of the Faiyûm. And so it remained throughout the period of Arab and Turkish rule until the revival of the irrigation system in the nineteenth century.

Until recently, scholars of the Roman Fayum agreed with Boak that these towns on the edge of the Fayum were abandoned between the 3rd–5th cent. AD. However, a few studies have reevaluated the evidence supporting this chronology. In his study of Late Roman ceramic forms from Karanis, Nigel Pollard has demonstrated that the town was occupied until the early 6th cent. AD. Additionally, re-evaluation of

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1 This paper reworks material originally presented at the Ninth International Congress of Egyptologists, published in J.-Cl. Goyon and Cardin (eds.), Proceedings of the Ninth International Congress of Egyptologists - Actes du neuvième congrès international des égyptologues: Grenoble, 6–12 septembre 2004. Orientalia Lovaniensia Analecta 150 (Leuven 2007) 1051–1060. This current paper corrects errors in the previous work and examines the abandonment of towns in the Fayum in light of several recent studies and fieldwork that were not considered in the previous paper.


3 For a summary of the earlier scholarship see P. van Minnen, "Deserted Villages: Two Late Antique Town Sites in Egypt," BASP 32 (1995) 41–56.

the references in Byzantine and early Arabic papyri for towns on the eastern edge of the Fayum has shown that some were still occupied as late as the 8th cent. AD.5

Nevertheless, the breakdown of the irrigation system is likely a factor that contributed to the abandonment of towns in the Fayum. Due to the nature of its topography, irrigation in the Fayum from the Ptolemaic dynasty until the present has depended on a single source of water and a complex network of high-level feeder canals with smaller drains. Localized problems at the source of water would have system-wide effects. The chronic problems of water supply documented for the 3rd–5th cent. AD6 are intrinsic to this system. The maintenance of the feeder canals was a vital concern for the local administration in all periods, and catastrophic problems in the Fayum’s water supply are in evidence in the Ptolemaic period7 just as in the 19th cent.8

This paper recalls Boak’s irrigation theory, asking if the scenario of a breakdown in the irrigation system has explanatory value as a theory even if the chronological parameters must be adjusted. The paper focuses on the northeast corner of the Fayum, where many of the towns outlined in Boak’s theory can be found. The history of settlement in this area can be traced by examining the major irrigation canal that traversed the northeast edge of the Fayum in antiquity and the towns found along its length.

**Ptolemaic-Roman Period: The ḫnt and ḥra[i]n diwān[į]**

The Ptolemaic dynasty’s large land-reclamation project in the Fayum in the mid-3rd cent. BC developed new towns in areas that had formerly been part of the ลำับ, "marshland or lake," of Moeris.9

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6 van Minnen, op.cit. (above, n. 3) 50–51, points to P.Haun. III 58, a cheirograph from Karanis dated AD 439, as an illustration of the demise of the irrigation system in the Fayum of the 5th century AD. The text is a declaration made by a group of men to the clergy and villagers of Karanis concerning the use of water (νερών) in the vicinity of a place called Θανεσσαμήν. It is difficult to evaluate how the papyrus can provide information about irrigation in the northeast Fayum since the place-name Θανεσσαμήν is otherwise not attested in texts. Moreover, this papyrus provides no direct indication about where this place was. D. Bonneau suggested that the word μονάς in ll. 18–19 of the papyrus is a mistake for νομάς "pastures," (see Bonneau, op.cit. [above, n. 4] 3–23 at 8–13). She therefore placed Θανεσσαμήν in the region of the modern town Tamīyyah, where a lake and marshland existed until the early 20th century. Even if Bonneau’s idea is correct, the information from the papyrus is still not indicative of problems in the irrigation system, because this lake and its marshlands are natural features of the drainage in this part of the Fayum. Water for the lake at Tamīyyah would come primarily from the Masraf al-Bats ravine. The ravine forms the natural conduit for Nile water to flow directly from the Bahr Yusef into the northeast Fayum. An efficient irrigation system in the northeast Fayum diverts water from this ravine in order to irrigate higher lands (see C. Orrieux, Zénon de Caunos, parépidèmos, et le destin grec. Centre de recherches d’histoire ancienne 64 (Paris 1985) 126, 130–131. Irrigation improvements in the early 20th century actually drained the lake of water. P.Haun. III 58 does, however, still give an indication that people were concerned about their rights to access water in the 5th century AD.


8 See section below under the heading "Hawara, the Bahr Sharqiyah, and Bahr Abdul Wahbi" and note 53.

9 For a summary of the evidence of the Fayum’s development in the early Ptolemaic dynasty see Thompson, op.cit. (above, n. 7) 123–139; also J.G. Manning, Land and Power in Ptolemaic Egypt. The Structure of Land Tenure (Cambridge 2003) 99–125. For additional summary, as well as translation and citations of papyri related to the developments in the time of Ptolemy II and III, see N. Lewis, Greeks in Ptolemaic Egypt (Oakville, Conn. 2001) 37–45.
Papyri in the archives of Zenon and Kleon mention the towns of Philadelphia, Bacchias, Tanis, and Hephaistias (Fig. 1), among other smaller settlements in this region. The economic existence of these towns was dependant upon an adequate supply of irrigation water. Irrigation water from the Nile reached the Fayum via the ancestor of the modern Bahr Yusef, for which there are many names attested in papyri, including the Ἀργαίτις διώρυξ, "Argaitis canal," in Greek and t3 ἤν.τ n Mr-wr, "the canal of Moeris," in Demotic. The aforementioned towns of the northeast Fayum received water for irrigating their fields from a secondary canal that branched off the Bahr Yusef near Αὖνηρις, Ἦν.τ-wr.t in Demotic, the site of the ancient Labyrinth and the modern archaeological site of Hawara. In the 3rd cent. BC, this feeder canal was called the διώρυξ Κλέωνος, "canal of Kleon," or μεγάλη διώρυξ, "large canal." In Demotic, this canal may have been called simply t3 ἤν.τ, "the canal." Additional Greek references for this canal mention the ὀρεινὴ διώρυξ, "desert canal," of such-and-such-town; references to the ὀρεινὴ διώρυξ of the town Patsontis are especially prominent in corvée labor receipts from the 2nd and 3rd cent. AD. The name ὀρεινὴ διώρυξ Πάτσοντις may have been used for the entire canal. The precise location of the town of Patsontis is unknown but is likely in the northeast corner of the Fayum between Bacchias and Karanis.

Many of the towns in this area of the Fayum were depopulated in the economic and political crises of the 3rd cent. AD. Although occupation is attested in this part of the Fayum for several centuries after, it

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13 Ibid., II 229–231, Suppl. I 131.
17 Calderini and Daris, *op. cit.* (above, n. 10) Suppl. III 126.
18 Orrieux, *op. cit.* (above, n. 6) at 124–125.
20 Calderini and Daris, *op. cit.* (above, n. 10) Suppl. IV 72–73, Suppl. I 220, Suppl. II 156, Suppl. III 121.
was perhaps on a reduced level. References in papyri and coin finds suggest that Karanis had some occupation into the early Islamic period.  

The archaeological remains of Byzantine and early Islamic dates on the Kom Sud at Umm al-Athl are the latest evidence for occupation at Bacchias.  

The latest papyri mentioning Philadelphia and the latest tombs in the surrounding necropoleis date to the 4th cent. AD, although occupation of this town may have continued for some time later. The latest textual references to other towns probably located in the extremities of the northeast Fayum occur in papyri dating to the 7th and 8th cent. AD. After the 8th cent. AD, sparse occupation in these towns may yet have continued even if evidence for it has not been preserved in the textual or archaeological record.

By 1240 AD, however, about the time 'Uthman al-Nabulsi wrote his Kitab Tarikh al-Fayum wa Biladhi, the northeast Fayum had the ruins of many towns. Moreover, the towns on the easternmost side of the Fayum occupied in the time of al-Nabulsi are far to the west of the Fayum’s boundary in antiquity. Clearly, a major change in the living conditions occurred between the 8th cent. AD and the 13th cent. AD which made settlement along the edge of the Fayum unfavorable.

**Medieval Period: The Bahr Wardan**

Al-Nabulsi’s description of the Fayum shows that the irrigation system had changed since late antiquity. He reports that two large canals were found on the borders of the Fayum that had silted up and been abandoned by his time. He refers to the abandoned canal that was on the northeast side of the Fayum as the Bahr Wardan. Furthermore, al-Nabulsi provides a list of ten deserted towns that were found along

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23 Keenan (2003), *op.cit.* (above, n. 5) 125–129.


25 Davoli (1998), *op.cit.* (above, n. 24) 142b. Burials in the cemetery of Fag el Gamus, found 5 km to the south of Philadelphia have been dated from the 2nd cent. until the 8th cent. AD, see C.W. Griggs *et al.*, "Evidences of a Christian Population in the Egyptian Fayum and Genetic and Textile Studies of the Akhmim Noble Mummies," *BYU Studies* 33 (1993) 214–243. This cemetery, however, is not associated with the population of any one town in the Fayum, see C.C. Maribeth *et al.*, "Indexing and Cataloging Textiles from the Fag el Gamus Cemetery in Fayum, Egypt to Determine Their Relationship with Known Coptic Textiles," *Clothing and Textiles Research Journal* 21 (2003) 120–129 at 121. The burials would therefore unfortunately not serve as direct evidence for the survival of the nearest towns into the 8th century AD.

26 For the chronological extent of papyri mentioning the villages of Alabanthis, Hephaistias, Letopolis, and Tanis, which were probably situated along the canal, see: <http://www.trismegistas.org/fayum/index.php>.

27 One must also note that villages in the northeast Fayum that were found near the Masraf al-Bats/Bahr Belama, such as Seila and Kerkosoucha Orous, appear in the land holdings of prosperous late Byzantine estates, see J. Banaji, *Agrarian Change in Late Antiquity: Gold, Labour, and Aristocratic Dominance* (Oxford-New York 2001) 179.


30 Shafei Bey, *op.cit.* (above, n. 28) 300.
this canal, including Umm al-Athl (عَمَّ الْأَثَل), Dimeh (دِمِهٌ), and Washim (وَشْيِم).\textsuperscript{31} Because these town’s names correspond to the names of modern archaeological sites – namely Umm al-Athl, Dime, and Kom Ushim – several scholars have rightly identified the Bahr Wardan with the ὑδάτινη διώρυξ 
Πατσωύντεως.\textsuperscript{32}

**Hawara, the Bahr Sharqiyyah, and Bahr Abdul Wahbi**

The remains of the abandoned Bahr Wardan canal were a prominently visible feature on the Fayum landscape in the 19\textsuperscript{th} century. The visible remains confirmed that the Bahr Wardan was indeed the northern feeder canal of the Ptolemaic-Roman Fayum, since it followed a path near archaeological sites from that period.\textsuperscript{33} In 1900–1907 the Egyptian irrigation engineer 'Abdul Wahbi Bey built a new canal\textsuperscript{34} over the remains of the Bahr Wardan in order to introduce irrigation water to parts of the Fayum that had not been cultivated since antiquity.\textsuperscript{35} This work destroyed most of the ancient canal’s remains in the area between Hawara and Petrie’s Kom No. 1 (Fig. 1). Remains of the canal were visible between Kom Kharaba al-Kabir and Kom Umm al-Athl through the middle of the 20\textsuperscript{th} cent.\textsuperscript{36} Since the completion of the Aswan High Dam in 1970, the expansion of agriculture in the Fayum has covered over most of the ancient canal. Consequently, most of the canal’s remains are less recognizable today. Nevertheless, by closely scrutinizing maps of the 19\textsuperscript{th} cent. and satellite imagery\textsuperscript{37} of the northeast Fayum, it is possible to rediscover much of the course of the ancient canal (Fig. 1).

The section of the Bahr Wardan that curved around the archaeological site of Hawara, however, is not visible in satellite imagery or on early maps. The 'Abdul Wahbi canal, constructed by 'Abdul Wahbi Bey, cuts across the middle of the archaeological site, preserving the course of an earlier canal (Fig. 2). The earliest maps of Hawara and descriptions from the 19\textsuperscript{th} cent. call this earlier canal the Bahr Sharqiyyah,\textsuperscript{38} or the Bahr Seilah.\textsuperscript{39}

\textsuperscript{31} Moritz, *op.cit.* (above, n. 28); Shafei Bey, *op.cit.* (above, n. 28).
\textsuperscript{32} Wessely, *op.cit.* (above, n. 21) 119; Calderini and Daris, *op.cit.* (above, n. 10) IV 72; Bonneau, *op.cit.* (above, n. 14).
\textsuperscript{34} Called Bahr Wahbi on the Survey of Egypt 1:25,000 scale map, sheet 72/600 (1952); called Bahr Wahbah on Egypt Survey Authority 1:50,000 scale map, sheet NH36-E2d (1997).
\textsuperscript{37} Many of the remains of this canal can still be seen in DigitalGlobe\textsuperscript{TM} imagery available through Google Earth\textsuperscript{TM}.
\textsuperscript{39} See the map of the Fayum’s hydrology included in Linant de Bellefonds Bey, *Mémoires sur les Principaux Travaux d’Utilité Publique exécutés en Égypte* (Paris 1872–1873); also the map in Major R.H. Brown, *The Faiyum and Lake Moeris*
The archaeological remains at the site of Hawara show that the modern canal is not built on the course of the ancient canal. Katholieke Universiteit Leuven archaeological surveys at Hawara have established that ceramic debris on the surface of the southwestern part of the site indicates the presence of a settlement here from the 3rd cent. BC until the 1st cent. AD. The modern canal cuts through the foundations of mud-brick structures of this settlement, and stone debris from the 12th dynasty mortuary temple of Amenemhat III on which they were built. At the north end of the 'Abdul Wahbi canal, the Leuven survey has found remains of a church, settlement and necropolis which were occupied until the beginning of the 6th cent. AD. This area was also cut into by the excavation of the modern canal at a later date. The archaeological evidence at Hawara therefore suggests that the canal across the site was created after the 6th cent. AD, and consequently that it is not the original course of the ὄρεινὴ διώρυξ Πατοσώντεως.

Karl Richard Lepsius visited Hawara in 1843 and undertook excavations and survey of the ruins. He states in a letter that local sources told him that the Bahr Sharqiyyah was created by Sultan Barquq, who ruled from 1382–1389 and 1399–1404 AD. The scholarship on Hawara has consequently referenced Lepsius in attributing a 14th cent. AD date to the canal cutting across the site. However, since al-Nabulsi includes the Bahr Sharqiyyah in his description of the Fayum, we can suppose that the canal across Hawara in fact was dug before the mid 13th cent. AD.

Although the route of the modern canal across Hawara is demonstrably not that of the ancient canal, the route of the ancient canal might be inferred from the orientation of remains of the Bahr Wardan. Lepsius's plan of Hawara shows part of the Bahr Wardan canal on the northwest corner of the site (London 1892). The canal is not mentioned in the description of the site made by the Napoleonic survey: Commission des Sciences et Arts d’Égypte, Description de l’Égypte (Paris 1809–1828), "Antiquités Descriptions Tome II," at 323–341. Nevertheless, the canal was indeed present at the site and not constructed after 1800 since it appears on the map of the Fayum: ibid., "Atlas Géographique," at folio 19, pace E.P. Uphill, Pharaoh’s Gateway to Eternity: The Hawara Labyrinth of King Amenemhat III (London 2000) 2.


Areas I–II of the Leuven survey: Uytterhoeven, op.cit. (above, n. 40) at 49, 69, and 81 fig. 1.


Shafei Bey, op.cit. (above, n. 28) 300.

Lepsius, op.cit. (above, n. 42) Tafelwerke Abteilung I Bild 47.
Remains of the head of the Bahr Wardan canal are identified in the 1887 *Irrigation Report of the Public Works Ministry* as two "enormous mounds of silt" 10 kilometers downstream from al-Lahun on the north bank of the Bahr Yusef\(^{47}\) (Fig. 3). These mounds are visible on satellite imagery from the 1970's.\(^{48}\) The elevation of the desert plateau on which the site of Hawara sits is 5 meters or more higher than the elevation of these mounds.\(^{49}\) The route between the head of the Bahr Wardan on the banks of the Bahr Yusef and the part of the Bahr Wardan recorded by Lepsius on the northwest of Hawara would therefore skirt along the west side of the desert plateau and southwest corner of the site of Hawara, while maintaining approximately the same elevation of 25 m above sea level\(^{50}\) (Fig. 3).

### Demise of the ancient canal

The evidence concerning the course of the medieval and modern canal, dug directly across Hawara, and the posited location of the ancient canal, going around Hawara on the west side, suggests that a significant effort was made sometime before the 13th cent. AD to move the canal. The Bahr Sharqiyyah was cut through the archaeological site of Hawara with a width of approximately 30 meters and a depth of approximately 13 meters for approximately 1 kilometer.\(^{51}\) The task of excavating this canal would have involved the removal of mud-brick remains, compacted stone debris from the remains of the Labyrinth, and a significant amount of limestone bedrock. This observation begs the questions: "Why was this canal considered important enough to warrant the time and labor of its construction?" and "Why did the medieval canal not follow the same route as the canal in antiquity?"

The archaeological evidence suggests that the ancient ὁρεινὴ διάβασις Πάτσοντες flowed to the west side of the site of Hawara. The modern topography of the area to the west and southwest of Hawara, however, poses a problem for any canal. 200–300 meters to the west of Hawara, the ground slopes quickly into the Masraf al-Bats ravine\(^{52}\) (Fig. 3). The Masraf al-Bats ravine is 10+ meters deep and runs towards the northwest of the Fayum for approximately 45 kilometers before emptying into the Birket Qa-run (Fig. 1). A canal flowing on the west side of Hawara is precariousely close to the edge of the Masraf...
al-Bats ravine. Moreover, the shape of the site of Hawara would necessitate that a canal circumnavigating
the site would need to bend sharply at the southwest corner. This bend would have created a stress point
where the canal’s banks could break during the Nile’s inundation.

Should the canal carrying the water for the northeast Fayum have broken at Hawara, the conse-
quences would have been disastrous. The Khedive Muhammed Ali’s chief irrigation engineer, Linant de
Bellefonds Pasha, noted that a breach of the Bahr Yusef’s bank by the Masraf al-Bats in 1820 discharged
the entire load of the Bahr Yusef down the ravine and directly into the Birket Qarun.53 While the Nile
flood was at its height, the water’s force scoured out the sides of the riverbank and the ravine, removing
limestone bedrock and leaving a crater in its wake. Günther Garbrecht and Horst Jaritz have suggested
that destruction of the Itsah-Shidmuh dike, the most important feature of Roman and Byzantine irriga-
tion system in the southern Fayum, could have occurred in the catastrophic floods in 702–704 AD or
1159 AD.54 After 1159 AD, this dike was not repaired by the time of al-Nabulsi, in the 1240’s AD. The
damage from extraordinarily high Nile floods in these years may also have destroyed the canal at the bend
around Hawara where the topography made it most vulnerable. Water released from the canal would
have scoured away the ground, making repair on the canal bed more difficult. If the canal broke repeat-
edly, the ground level would eventually be too low to permit adequate slope to repair the canal bed.

Conclusion

Returning to Boak’s theory of a breakdown of the irrigation system, these observations concerning
the canal around the site of Hawara offer a possible scenario for the abandonment of the northeast Fayum.
A canal constructed through the middle of the site of Hawara avoids the problems of the topog-
raphy to the west of the site. The excavation of the Bahr Sharqiyyah canal through the middle of the site
of Hawara was probably necessary when a canal that went around Hawara had been destroyed. The ex-
penditure of effort required to excavate the canal through the site of Hawara, done sometime between the
6th–13th cent. AD, implies that the previous canal had been broken beyond repair. The ancient feeder can-
nal that went around Hawara was the only source of water for the fields on the edge of the northeast Fa-
ym. Should the canal’s banks have broken at the weak point near Hawara, all the water for the northeast Fayum would have been lost to the Masraf al-Bats ravine. From the time of the final breach of the Bahr
Wardan until the construction of the Bahr Sharqiyyah, this area may have been without water for several
years or even generations. In this scenario, there would have been a strong incentive for towns of the
northeast Fayum, whose livelihood was based largely on agriculture, to migrate to an area in the interior
of the Fayum with a more reliable source of water.

53 Sir W. Willcocks and J.I. Craig, *Egyptian Irrigation* (London 1913) 443, and R. Fourtau "Le Nil et son Action Géolo-
50–51, quoting de Bellefonds, *op.cit.* (above, n. 39) 54.

54 See G. Garbrecht and H. Jaritz, *Untersuchung antiker Anlagen zur Wasserspeicherung im Fayum/Agypten*
(Braunschweig-Cairo 1990) 184.
Fig. 1:
Map of the northeast Fayum showing places mentioned in this paper, when their location is known. The solid black line shows the course of the Bahr Wardan visible in satellite imagery. The broken black line shows its course that might be reconstructed from historical sources. The white areas are desert. The grey areas are modern cultivation.
Fig. 2:
Map of the area of Hawara, showing the course of the modern canal across the site, the location of remains of the Bahr Wardan, and the relevant areas of the Leuven survey. The white areas are desert. The grey areas are modern cultivation.
Fig. 3:
Map of the area around Hawara, showing the Abdul Wahbi canal, the Bahr Yusef, the remains of the Bahr Wardan, and the Masraf al-Bats ravine. The dashed line indicates the postulated course of the Bahr Wardan. The white areas are desert. The grey areas are modern cultivation.