

## 8. OXYRHYNCHOS: METROPOLIS AND LANDSCAPE

Eva Subías  
*Universitat Rovira i Virgili*

There are few sites where it is possible to combine the papyrological and archaeological study of the Graeco-Roman city in Egypt. Oxyrhynchos has produced many documents that have been and continue to be used by papyrologists. For some years now it has also been producing archaeological data. However, unlike other ruins, the informative value of Oxyrhynchos lies in its particularly well-preserved natural setting, which has only fairly recently begun to undergo major transformations. These factors have made the site a laboratory for investigating a complex and surprising urban situation.

Strangely enough, although at first sight the ruins appear discouraging, their reconstruction through the analysis of aerial photographs and documents reveals an interesting city and surroundings. Consequently, our proposed reintegration of the Graeco-Roman city, returning to and studying in depth the subject matter we chose for the Workshop,<sup>1</sup> contains more imaginary archaeological elements than material ones. Nevertheless, we believe that in view of the dangers facing Egyptian sites, archaeologists should make this restoration effort and advance their theories in order to point research in the right direction before it is too late.

Based on the emerging data, we are able to obtain a picture of a special city, one that is different in certain aspects to other Mediterranean and Egyptian settlements. As a result, our goal is to give a succinct analysis of this urban layout in relation to those of other Egyptian cities, especially in the light of the work carried out in ancient times in the area surrounding the city, which no doubt modelled the urban landscape of Oxyrhynchos.

### 1. The programme of hellenistic cities in Egypt

There is a strong current of thought affirming that the cities of the Valley are comprised only of large villages,<sup>2</sup> as they were not originally classified as *polis*.<sup>3</sup>

Even metropolises, the Nome capitals, the places of residence of the new elite classes and administrative centres were considered as such in the absence of true municipal magistracies. Paradoxically, written texts bear witness to the complex, monumental nature of these cities, which were set up with the appropriate facilities for the Greek, and later, the Roman ways of life. We believe that the conceptual debate about the categories of settlements during the Ptolemaic and High Imperial period in Egypt should not lead us to ignore the enormous degree of development in Hellenistic settlements and thus disregard the origin of their urban planning systems.<sup>4</sup>

In truth, judging from the scientific literature, urban planning in the Hellenistic cities of Egypt appears to have been focused almost exclusively on the reorganisation of worship and temples. Apart from places of worship, work would have begun on some of the facilities usually found in Hellenistic cities, although the monumental facets of the urban landscape mostly belong to the Roman era. This poor perception of cities can probably be related to the imprint of a strong “Egyptian dimension” of Ptolemaic colonisation seen, for instance, in certain toponyms: the dynastic foundations were associated with real names, but often also kept their Egyptian names.<sup>5</sup> It is interesting to note that important metropolises in Middle Egypt, such as Oxyrhynchos, Heracleopolis or Hermopolis, had no dynastic names. Does this mean that the Ptolemies showed respect for the religious tradition of the Late Period? Or should we take it that the transformation of the Nome capitals into Hellenistic cities was not conceived as a re-foundational act stemming from the monarchy? Indeed, the founding of cities belonging to the Ptolemaic period would be carried out by persons close to the monarchs, who sometimes acted in their own names.<sup>6</sup> If the creation of a framework of urban life in the Hellenistic world was so important, how can we consider that the work executed in the old metropolises was not important enough to be considered re-foundational? If the metropolises were not subject to pre-established planning, we should probably consider

1. This document was drafted as part of the Ministry of Science and Innovation R+D Project HAR2008-01623 “The Egyptian City during the Classical Period: Organisation of Space in Graeco-Roman Egypt” with the assistance of the Rovira i Virgili University and the Catalan Institute of Classical Archaeology.

2. Bowman 2000, for example, refers to “country towns”.

3. However, some think that speaking in these terms is a modern and inappropriate formulation. Cadell 1984.

4. Bingen 1975. The author is also opposed to the reduced image of the metropolises.

5. Mueller 2006, 1-7.

6. Heinen 2000.

that the ancient centre of the Nome capital grew of its own accord with the arrival of the new inhabitants and that the communities took it on themselves, with no guidelines or planning, to establish facilities that were considered essential, such as gymnasiums, baths and theatres.<sup>7</sup> It is difficult to image a city that had these facilities but lacked a comprehensive road and service structure. Perhaps the work carried out in the metropolises was not worthy of the designation foundation or re-foundation and such interventions were likely to have been staggered over time. However, to understand the development of the cities, it is necessary to accept that there was some notion of planning in a more or less broad sense, depending on the category of the settlement.

It may seem provocative to suggest the existence of an urban programme in the reorganisation of the metropolises, since it would appear to mean that the Ptolemies had a very clear idea of their interventions in Egypt from the outset. In actual fact, the papyri show above all a concern for maintenance and the consolidation of farming and craft activities, while there is little evidence that points to a foundational policy based on establishing a framework for municipal life. To explain this lack of interest it has been argued that Macedonians were not concerned with the polis idea and that Pharaonic despotic power did not encourage citizenship.<sup>8</sup> However, Macedonian domination made it necessary to exert control over the territory from the standpoint of internal and external peace, giving rise to a policy based on settlements.<sup>9</sup> We need to elucidate which type of settlement formed part of that occupation strategy that, rather than being military in nature, appears to have been based on encouraging industrial and commercial structures, which were without doubt essential for the city framework. Indeed, studies have recently begun to highlight the role of agglomerations as business centres.<sup>10</sup> Opening ourselves up to this idea of Ptolemaic colonisation makes it possible to analyse the urban activity of agglomerations

with similar criteria to those used in other areas of the Hellenistic kingdoms, i.e. as a privileged scenario of the monetary economy.

Although before the conquest the country enjoyed an administrative structure which was respected to a large extent, it became necessary to set up a social body that remained loyal to the new sovereigns, since they were not willing to govern the country personally.<sup>11</sup> Emphasis has often been placed on the rural nature of the country's colonisation through cleruchs, but civil immigrants and successive waves of soldiers or mercenaries without the right to land also undoubtedly inhabited the settlements, both cities and villages. The arrival of these new inhabitants would certainly have had an effect on the planning of the metropolises, as suggested by some urban toponyms that link ethnic names to specific quarters.<sup>12</sup> In this respect, it is important to note that both in Philadelphia and the Red Sea port of Ptolemais the city was inhabited by military settlers,<sup>13</sup> which to a certain extent led to the allocation of urban houses, thereby justifying land parcelling strategies.<sup>14</sup>

On the other hand, hardly any material information exists about the building of military camps, although they may have been relatively numerous in border areas or in the valley itself during times of crisis. For example, we know there was a *phourion* inside the agglomeration or perhaps even inside an ancient temple in Hermopolis.<sup>15</sup> The persistence of the term as a toponym until a later era in the case of Hermopolis has led to the proposal that there was a kind of dipolis.<sup>16</sup> Nonetheless, archaeology provides no significant or clear architectural and urban planning data for that temple-barracks union. In the absence of significant archaeological data, it is not clear whether the Egyptian city of the Ptolemaic era was able to include military structures within its enclosure, as would be the case of many of these during later periods.<sup>17</sup>

Regardless of the identity of the new settlers ruled by the Ptolemies, they are important in terms of their

7. Although the papyrological information on the Ptolemaic period is relatively poor, we do know that the theatre

8. Jouguet 1968, 68-70.

9. Katja Mueller, analysing the Ptolemaic policy of colonisation, has stressed the importance of foundations and re-foundations as an instrument of control and territorial dominion, as opposed to other Hellenistic kingdoms. Mueller 2006.

10. Manning 2003, 6 and Manning 2006, 257-274.

11. As indicated by Clarysse 2000, who says that on one occasion Ptolemy III would have gone to the Fayum and to Oxyrhynchos between 243 and 242 BC (*Pap. Teb. III, 748 and 749*).

12. In the case of Oxyrhynchos, the existence of *amphoda* has been confirmed, with names that allow it to be assumed that those immigrants existed from the start of the Ptolemaic period. Rowlandson 2007, 211 and note 7 quoting from Whitehorne 1995, 3053.

13. Heinen 2000, 146.

14. In Evergetis, the assignation of a *stathmos*, understood as a dwelling, has been documented. Cohen 2006, 347.

15. Justified by the close relationship of Ptolemaic soldiers with the construction of temples, particularly in Upper Egypt. Dietze 2000, 81-82.

16. Schwartz 1977, 59-63. That division is inferred from the city's titlature of high priest, which during the Pharaonic period referred to two squares based on the record of a persistent distinction between phourion and polis until the later period. Also, Dunand 1989, 146.

17. *Praetoria* are documented by papyri in Antinopolis, Arsinoe, Hermopolis, Oxyrhynchos and Panopolis, according to Lukasiewicz 1986, 177-178. Camps, archaeologically confirmed in Luxor, Dionysias, Narmouthis, etc.

numbers and they settled in both urban and rural areas.<sup>18</sup> However, apart from Alexandria, few Egyptian cities have a regular land re-parcelling scheme based on the Hellenistic system. These examples include the well known case of the colony of Philadelphia. There is no doubt that the vitalisation of the Fayum corresponds to a very special case of value enhancement through a region based on royal intervention. It is however obvious that urban development also took place in other zones during the Hellenistic period, as a resource for the settlement of colonists.<sup>19</sup> In our opinion, the urban planning discovered at Oxyrhynchos, which is analysed in more detail below, could correspond to a similar value enhancement process and therefore the suggestion that the city had a founder called Apollonios<sup>20</sup> would certainly make sense. Apart from this reference, nothing is known about the birth of the Hellenistic city, in which it is assumed that immigrants arrived along with veterans and that there was an assimilation of Egyptians who wished to become part of the urban community.<sup>21</sup> In fact, the allocations granted to veterans could have included household structures of an urban nature.<sup>22</sup>

Returning to the suggestion of a re-foundational programme, the truth is that parallel, regular urban parcelling is only observed in a few examples in Egypt, while other cities show an orderly, but less systematic structure. In this respect, we could mention some of the towns of the Fayum, such as Tebtynis, Narmouthis or Soknopaiou Nesos. Thus, for example, in these cities the housing blocks have units with similar surface areas and façades aligned along the streets. The repetition of those modules cannot be merely spontaneous and they must correspond to an urban layout, in this case adapted to a type of house with its origins in the local adobe construction tradition and to streets with no vehicular traffic, which are typical of secondary settlements. That planning is not the “hippodamic” type in the sense of being regular, parallel and supported by a hierarchy of streets and avenues, but tends to be so due to the existence of certain streets that connect the space and also due to the appearance of blocks of dwellings.<sup>23</sup> Thus in Tebtynis the definition of blocks and adjacent constructions can be seen around the *dromos*, one of which corresponds to an aristocratic, Mediterranean-type dwelling, i.e. a columned porch,

resulting from a design of a house that is closely linked to that of the plot.

Nevertheless, we should recover the hierarchy of the settlements to assess the planning methods and avoid detecting a single programme. In the case of Hellenistic Egypt, three levels are considered: that of the polis, which is highly restricted, that of the metropolis and that of large villages or rural settlements. Some of the settlements, which we could consider as secondary, offer the most complete and original image of the urban planning methods used in the Graeco-Roman period, both in the Fayum and the Oases, as explained by Paola Davoli in this volume. The extraordinary importance acquired by the *dromos* in connecting urban space is proof of its originality, since it is the scenario of the ritualised processions and civic-religious acts performed in banqueting halls.<sup>24</sup> However, it is not just a question of the *dromos* controlling civil life, but of how a general form of planning is imposed throughout the whole city. The truth is that although blocks of regular or modulated constructions emerge around the avenue, as in Tebtynis or Narmouthis, the temple-*dromos* binomial is a unit which is relatively isolated from the rest of the agglomeration. Although it is the fundamental reference of the urban landscape, sometimes reinforced by an eminent position, the temple and its *dromos* do not act as elements that connect these cities as a whole. The city extends around them in a more or less rational manner through its thoroughfares and the emergence of public space. For instance, in Narmouthis the plotting of the streets seems to be particularly systematic.<sup>25</sup> Moreover, the main temple is not in a pre-eminent location and the highest part is occupied by an extensive agglomeration. The problem lies in attributing these organisational elements to the foundational period or considering that they may have been an exercise for enlarging the settlements.

The sacred way maintained its importance during the Roman period, giving rise to acts of patronage and monumentalisation. It is sufficient to analyse where the kiosks and pavilions were built at better known sites such as Tebtynis. However, excavations will probably add new elements of the control of civic life, for instance, the square behind the temple in Narmouthis. The nuances and changes in the design of this holy

18. There are extensive references to the demographic problem which is the subject of debate, for instance Clarysse and Thompson 2006.

19. Rathbone 2000, 49, indicates the continuity of the foundations and relocations of cleruchs during the 2nd and 3rd centuries BC.

20. Krüger 1990, 82.

21. The preference of colonists for urban life during the Roman period, particularly in Oxyrhynchos, was demonstrated by Whitehorne 1990, 544.

22. In Antioch there is documentary evidence for the assignation of household plots to veterans. Launey 1987, 684 note 2.

23. See for example Soknopaiou Nesos. Maehler 1978.

24. In Tebtynis the *dromos* of the temple of Soknektynis is flanked by cohabitation facilities but they date from Roman times (Trajan). Galazzi, Hadji-Minaglou 2004, 197-204.

25. Planimetrics in Davoli 1998.

avenue would be essential in transforming smaller cities and also in the transformation of metropolises. Indeed, the topographic references to the city of Oxyrhynchos mention several *dromoi* and in some cases it is clear that they are integrated into the urban network, with another in the form of a monumental street and finally as the axis of a whole quarter.

Judging from the written documentation, monumentalisation in the cities was a slow process. Some elements which might appear to be essential took more than a century to materialise, as is the case of Dionysias, whose *dromos* is later than the date on which the city was founded.<sup>26</sup> And the references made to the facilities in Oxyrhynchos also have later dates; the first of these being a reference to a hippodrome dating from 1 BC.<sup>27</sup> Nevertheless, the gaps in the information relating to the start of the Ptolemaic era may be due to the difficulty of discovering archaeological finds relating to that period. Moreover, the dedication of monuments depended largely on private euergetism, a custom closely linked to the acquisition of citizenship rights. It is therefore no surprise that the most prolific and visible monumentalisation phase of the city in Egypt coincides with the later Roman period.

Although there is little urban data available about the Ptolemaic foundational phase, the category of the interventions appears to be reasonably sufficient to pinpoint the urban planning issue as occurring during the Ptolemaic era, i.e. references to founders and facilities (particularly baths) and visible urban planning at some sites.<sup>28</sup> There are also documents referring to munificence showing the importance of Hellenistic cities as a way of life.<sup>29</sup> The information emerging on the city of Oxyrhynchos is fundamental for clarifying the perception of the classic city in Egypt, although it is still too soon to know whether its monumental aspect is due to an extra element of Hellenism displayed by its inhabitants, as maintained by some authors.<sup>30</sup>

## 2. Elements from the Alexandrian and Roman tradition and from Pharaonic imaginary

Unfortunately, we know very little about the urban tissue of the metropolises. As we have already mentioned, the first impression, based on the planimetric

surveys of the cities, leads one to conclude that there was no planning and to stress the persistence of the Pharaonic tradition in the Nome capitals. Thus, the evolution of the metropolises would have given rise to cities concentrated on the hills around temples and palaces. As a result, we could well consider an ideological contraposition between a traditional city model and a Hellenic one promoted by Alexandrian imitation.<sup>31</sup> However, a debate in general terms is futile and we need more urban exploration elements than those currently available, although this does not mean that we cannot trace reference models in the existing urban data.

From the orographic point of view, the planning of Alexandria contains two prominent elements: the hill-top of Rakhotis, occupied by the Serapeum, and the palace, set on the hills of the north-east grid. This is an imposition that clearly contrasts with previous options, since the capitals of the Late Period were characterised by the proximity of the temple and palace enclosures acting jointly as a focus of agglomeration. It has been said that through this co-existence the differences between the profane and the sacred would have been reduced during the Late Period,<sup>32</sup> although we could also consider that proximity is evidence of a new way used by the royal classes to emphasise their closeness to the Gods. As regards the case in point, the essential objective is to record that the temple and the palace were near each other, as would also be the case in the Hellenistic city of Memphis. The difference between the models stems from a Greek demand in relation to the palace: the opportunity to provide it with a special port that was not to be used for general commerce, but as an entrance reserved for certain goods.

Nevertheless, the absence of monarchs in the metropolises makes it unnecessary to lay out a palatial area, although appropriate places of worship were needed, particularly the Serapeum. The documents from Oxyrhynchos lead us to believe that the Serapeum was on the summit of the most prominent hill, in the same location as the tombs from the Saitic period.<sup>33</sup> As a result, one could imagine, as in Alexandria, the definition of a political-religious "acropolis" dominating the city as part of an ideal urban programme. However, the position of the Serapeum in other cities is not known, despite the importance it would have

26. An inscription indicating a dedication to the dromos of Dionysias, dating from around the end of the 2nd -1st century BC, by an epistates. Wagner, Gascou 1978, 259-266.

27. Lukaszewicz 1986, 172.

28. Evaluating the impact of urban design during the Ptolemaic period. Heinen 1997, 129, n.9.

29. Van Minnen 1997, 447, particularly in relation to the gymnasium.

30. Montevicchi 1997.

31. In this respect, it has been said that in Roman times the city of Hermopolis, with a classical language for architecture already in use, still partly conserved a physiognomy derived from the division between the holy domain and the residential sector. Schwartz 1977 and Dunand 1989.

32. In the last instance, Leclère 2008.

33. Presumably the Serapeum of Oxyrhynchos would have been in the north-western grid of the city, coinciding with the acropolis where the High Necropolis is also located. Krüger 1990, 10.



had in new foundations such as Philadelphia, which goes to show that it is difficult to generalise. In addition, in other cases the temple of Serapis was added to a traditional religious site, as in Luxor, and in other cases it forms the centre of a suburban sanctuary such as in Memphis or Kanopos. In any case, the position of the Serapeum in relation to other cults and topography must have been fundamental in new cities.

On the other hand, the Hellenistic city promotes the monumental nature of the urban framework, with constructions of perspectives and the integration of architecture into the landscape. Furthermore, new cities stand out for the planning of their thoroughfares, in which the efficiency of communications and movement was taken into account. Thus, Alexandria would have been planned on the basis of a main axis running in a mostly east-west direction, with one or two large transverse streets running from north to south, thereby dividing the city into districts. In fact, Strabo (17.1.8) emphasises the intersection of just two main streets, which some have attempted to relate to the cardinal sense of space in Egypt. His opinion appears to be confirmed by a late initiative of Antoninus Pius, who highlights two gates in the city as a cosmic denomination, those of the Sun and the Moon.<sup>34</sup> Moreover, the same astronomic denomination appears in Hermopolis, the organisation of which is also based on two main streets.<sup>35</sup> However, even assuming the cardinal symbolism of the main streets as part of an ideal urban plan, the planning of large cities such as Alexandria and Antinopolis, and even Oxyrhynchos, would surely have been based on a greater number of main roads. As evidence of this, mention is made of the streets of Oxyrhynchos with different *dromoi*: the north gate, the south gate, the Pse gate, and those which appear to be more directly related to the temples of Taweret or Serapis.<sup>36</sup>

In addition to the form of the agglomeration, to understand a city from the Hellenistic period it is essential to see how and where the civil, administrative, leisure and commercial facilities are located and which routes are the most highly valued. Although the papyri indicate the existence of all manner of public, religious and private buildings, few cities allow this analysis, not even Alexandria itself. However, the scant visibility of the agora in the cities of Egypt is worth noting, with it being confined to purely mercantile functions. As an important metropolis, the ruins of Hermopolis could

serve as a reference and in this case the position of the agora does not appear to be prominent either; it is significant that even though the central space is planned in a regular fashion, with the intersection of the most important streets, it is occupied by the square of the *kómastérion*.<sup>37</sup> In the case of Oxyrhynchos the site of the agora is also not prominent and more references are made to the gymnasium, which, as the central focus of civil life in Graeco-Roman Egypt, would have occupied an important place in the city's topography and its monumental areas. In the Hellenistic world the gymnasium was surrounded by new facilities with different functions, particularly buildings used as meeting places and service facilities, forming the real centre of civic life, also from a material standpoint.

A succession of leisure facilities including the theatre, the hippodrome, the baths and commercial buildings was integrated into this city scheme. The subsequent evolution of Egyptian cities led them to be integrated more homogeneously with Roman urban culture and in particular with Eastern culture, so that the facilities would also have taken on new meanings and relative degrees of importance. Seen in that light, the Egyptian city is associated with the classical tradition, using the language of orders for the porticoes and temples of foreign divinities.<sup>38</sup> However, the final image of the city would be influenced by the appearance of the pylons, *dromoi* or obelisks, as in the Caesareum of Alexandria, and by the preponderance of mud-brick domestic buildings. Such buildings included in an urban setting constituted a new and essential type for the urban image, as they were built at a height in relation to regular plots, regardless of their traditional appearance.

Lastly, it should be said that most Hellenistic metropolises had a city wall, which was contrary to local tradition as the Pharaonic city could be open.<sup>39</sup> This fact allows us to emphasise the significance of the wall as an influence of Hellenistic models in Egyptian cities. Nonetheless, there are few signs of interest in poliorcetics, not even in Alexandria, and so the wall does not seem to be an overriding defensive need. This appears to have been met by a strategy of small forts, except perhaps along the edges of the valley,<sup>40</sup> where cities could include a camp. The absence of walls in smaller agglomerations could stress their function as status-defining elements, although we should not forget that the argument of archaeological silence does

34. Drew-Bear 2006, 200 n.7.

35. Krüger 1990, 98. That papyrus has also been attributed to Oxyrhynchos.

36. Krüger 1990, 98.

37. Bailey 1991, in particular Chap. 9. The author suggests the agora was located in the south-western grid, near the supposed site of the gymnasium.

38. Pensabene 1993. A review of the appearance of the most ancient decorative elements, Doric and Ionic capitals from the 3rd and 2nd centuries BC shows how Middle Egyptian cities were incorporated into classical language.

39. Kemp 2004.

40. Syene could be an exception, due to its border situation. Jaritz and Rodziewicz 1994, 120.

not allow the wall to be completely excluded. Moreover, some centres considered as secondary, for instance Soknopaiou, Narmouthis and Dionysias, have walls despite their lower status. As suggested, in these cases the wall would have been a method of protection from nature in exposed cities located in deserts, sheltering them from sandstorms or *razzias*.<sup>41</sup> Likewise, it is possible that dykes and walls could be confused with each other, as in Memphis, and serve as protection from flooding or, in other cases, from the flooding of the *wadis*. It would be particularly interesting to study the structure of the wall of Antinopolis in the sector where the *wadi* stream enters the city.

Obviously, in the ideal Graeco-Roman period city water is an essential reference. Water entered Alexandria through canals that were mostly underground and led flood water to large tanks. Other canals crossed the city above ground, supplying water to ponds and other leisure features. In this respect, it is important to consider the suggestion of the erudite programme of urban landscapes with gardens, as in the palatial quarter of Alexandria that evoked the River Meandros.<sup>42</sup> Canals, lakes and fountains formed part of the Pharaonic idea of the palace, comprising a fundamental system for accessing the traditional temple. What is remarkable is that through the Hellenistic experience this situation can be extended to the idea of the hole city.

In addition, the Egyptian agglomeration has an important seasonal component: the city is completely shaped when the water runs through its canals and reaches the edge of its quays. In the wet season, the appearance of the streets is relatively homogeneous as regards horizontal elevations, while low waters accentuate the uneven nature of the ground. In any case, water circulation is fragmented by bridges, steps and ramps, particularly with respect to the main temple, which is connected to the river or canal by navigable channels, as in Memphis or Athribis.<sup>43</sup> The aesthetic values of that landscape are obvious, but water was also a threat and required constant surveillance to be exercised on its course and on the ability of the infrastructures to adapt to it. Memphis, especially, was a changing city during its millenary history and had to adapt to the variations of the river.<sup>44</sup> Resistance and adaptation are two sides of the same environmental coin, which in this case was quite decisive.

### 3. The city of Oxyrhynchos in its geographical surroundings

The location of Oxyrhynchos is to a certain extent anomalous, as it is to the west of the Bahr Yusef Canal and open to the Libyan Desert. It is the only important city of the Middle Kingdom of Egypt with such a location, far from the fields and the opposite of the traditional Egyptian settlement pattern concentrated on farmland. It is currently almost buried under the sand. In fact, a 19th-century English traveller, Sir John Gardner Wilkinson (1797-1875), had already indicated that its position was not beneficial, since it is set on a gentle slope and has no other obstacles to prevent the desert sands from advancing towards the valley.<sup>45</sup> At the time of its foundation, the advance of the sand was not noticeable, as that process was only observed during the Roman period.<sup>46</sup> On the other hand, in the eyes of a governor wishing to establish a large metropolis, the site would have had its advantages, including precisely that of not invading the farming areas.

The great strength of Oxyrhynchos was, however, of a strategic nature, since it formed a communications node between the small oasis of Bahariya, about 100 km to the west, and the valley. It was a caravan centre, which historically meant that the city was open to Nubian and Libyan influences. Later, Oxyrhynchos also needed other overland accesses and in particular a route through the desert to Tebtynis, although its location is not known today.<sup>47</sup> The strategic importance of the metropolis was also obvious in a north-south direction, on the route between the Fayum and Upper Egypt. That relationship is more complex and comprehensive than would first appear, since the Bahr Yusef would not merely be an alternative route to the Nile, but also connect with it through the dykes and canals that multiplied the links between the series of towns. The Antonine Itinerary, which gives the Roman itineraries and routes, mentions the towns of Takona, Oxyrhynchos, Ibiou and Hermopolis along this route. This sequence includes towns situated between the Bahr Yusef Canal and the Nile, meaning that it would have been necessary to cross the valley. During times of flooding the route would have been difficult unless the dykes or other water courses were used. In this case, the existence of the Apollophanes Canal in the middle of the valley is particularly interesting

41. Davoli 1988.

42. Pensabene 2007, 177 and following, quoting Adriani 1966.

43. Summary by Leclère 2008, 61-90.

44. Bunbury 2008.

45. *Hand-book for travellers in Egypt; including descriptions of the course of the Nile to the second cataract, Alexandria, Cairo, the pyramids, and Thebes, the overland transit to India, the peninsula of Mount Sinai, the oases, &c. Being a new edition, corrected and condensed, of "Modern Egypt and Thebes"*, 285-286, at <http://scholarship.rice.edu/jsp/xml/1911/9190/1095/WilEgyp.tei-timea.html#index-div2-N3A8AD> (last accessed Feb. 2012).

46. Butzer 1959.

47. Adams 2007, 33.

because of the major repairs that were made to it.<sup>48</sup> It could be considered that the alternative to the fluvial route was precisely that of other courses which would have allowed the route to be shortened and two important ports (Oxyrhynchos and Athychis) to be connected. These channels may have been navigable or have provided a pathway along their banks.

The site of Oxyrhynchos has given rise to much thought in terms of the country's political and religious history.<sup>49</sup> Before its foundation, the nome capital was *Seper-meru*, which would have been located further north (on the boundary with the Heracleopolitan Nome), but the religious dispute between the followers of Osiris and Seth could have led to a radical change in its pantheon and perhaps its location. The predecessor of Oxyrhynchos (*Per-medjed*) is not documented until the 8th century BC, when the Saitic dynasty makes it the Nome capital. Therefore, the city is new. What is of interest to us now is that, apart from the political motivations, the abandoning of the old capital, possibly located near Safaniya or Shinaro,<sup>50</sup> could have been due to a gradual separation from the Bahr Yusef Canal owing to the shifting of its course to the east.

Little is known about the Late Period settlement in Oxyrhynchos. There is a necropolis containing the tombs of priests from the Saitic period in which a sanctuary is mentioned (*Per-khef*), which would have corresponded to an *Osireion* outside the city dating from the beginning of the Ptolemaic era (Ptolemy II Philadelphos). This necropolis, which we will refer to as high, is set on a large acropolis. The hill has not been fully explored, but its shape is suspiciously geometrical and a section of wall has been discovered that leads us to think of a large rectangular enclosure oriented in keeping with its cardinal axes. As a hypothesis, we could imagine that during the Late Period a religious and palatial settlement once stood on this hill. The sacred nature of the site would have favoured the continuity of its funeral uses, even after the necropolis had become integrated into the perimeter of the Graeco-Roman city.

The oldest Hellenistic remains on the site are fragments of a relief dating from the time of Alexander IV Aegros-Ptolemy I Soter.<sup>51</sup> There is no record of a foundational act during the Ptolemaic era, but there was a settlement of cleruchs, coinciding with intense

foundational activity in the Fayum. There is no doubt that this context led the city of Oxyrhynchos to benefit from the interest of the monarchs, as, according to W. Clarysse, it might have been visited by Ptolemy III.<sup>52</sup> Under these circumstances, given that there are monuments from the period, we should consider that major projects, such as the parcelling out of land, were carried out, as would be the case in a city foundation. The date on which the parcelling was carried out cannot be checked by archaeological means, due to the proximity of the phreatic level, but to confirm the Hellenistic period of the settlement, suffice it to say that some of the streets are quoted using the Ptolemaic term *aguia*.<sup>53</sup> Another argument in favour would be that the name of a founder is also mentioned.<sup>54</sup> However, the chronology of the new planning must be suspended and other arguments point to the fact that the Ptolemaic city developed mainly around the Serapeum, presumably in the area surrounding the old acropolis.<sup>55</sup>

As for the transformation of the city, land division that was occupied during the Saitic period can be observed at the foot of the hill. That hill is about 39m above sea level, while the low area is around 33.5m. This low area would have flooded naturally or without the need for major work, thereby justifying the fact that the Late Period city would have chosen the elevation. At that time the plain would have contained arable land along the river, as can be seen from an analysis of the aerial photographs, which show a series of oblique marks that precede the construction of the city. The inclination of the straight lines is from northwest to southwest, following the predominant orientation of the valley, which suggests a strategy based on using the current to irrigate the fields. To lay out the space for the future city, it would have been necessary to isolate this area from the course of the floods by means of two dykes, one to the north and another to the south. Later we will see the evidence that points to the use of these infrastructures. (Fig. 1)

Regular urban planning was possible in the event of having a healthy plain. The first signs of planning were observed after flying a kite fitted with a camera device over the site, using a system perfected by Y. Guichard and T. Sagory. These photographs were extremely valuable for stimulating the research and targeting the direction of our studies. Today, we cannot accurately define the area of the city based on the

48. Built or renovated during the Ptolemaic period: Rowlandson 2007, 210. For the course, Rowlandson 1996, 11-12.

49. Goyon 2008.

50. Safaniya according to Gomaa 1986, 349 note 4, quoted by Padró 2008, 7 n.2.

51. Mascort 2007, 77 n.5.

52. See note 11.

53. Krüger 1990, 94.

54. Krüger 1990, 82.

55. Daris 2000, 212 emphasises the proximity of the quarters, which were apparently older, to the contour of the Serapeum. Krüger 1990, 98, indicates that the parcelling could date from Roman times.

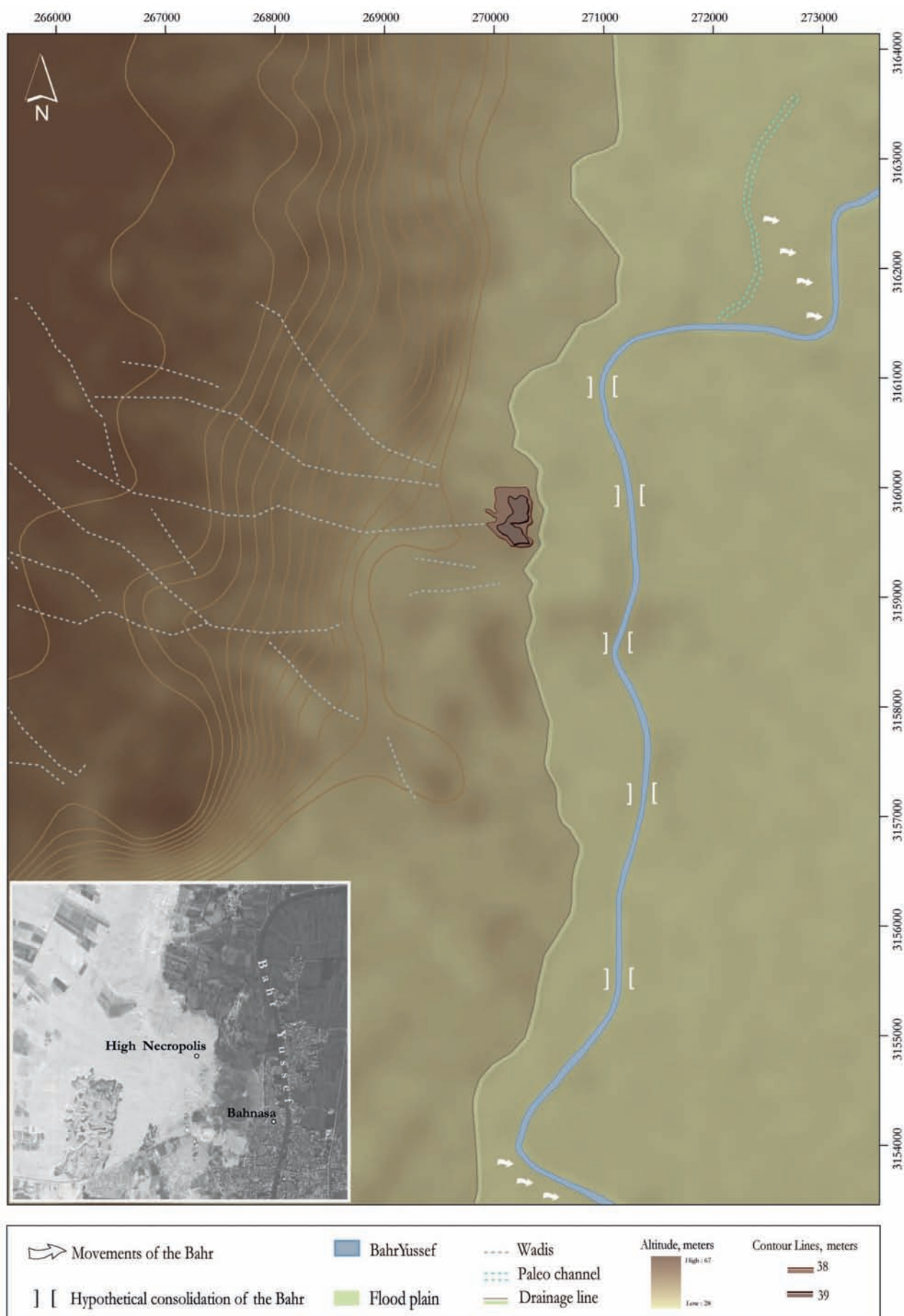


FIGURE 1. Topographical sketch of the layout of the Oxyrhynchos landscape.



archaeological remains, but we can obtain an idea of the surface area occupied by urban ruins. Those authors who have expressed an opinion state that this area is no more than 200 hectares and in general they have tended to minimise its importance. However, the remains of the wall and the spread of the terraces and archaeological remains lead us to think that at some point the city occupied an area of 300 hectares, not including the suburban area, and contained impressive monuments and domains.<sup>56</sup>

Having said this, it should also be noted that the traces of planning can only be observed with a certain degree of precision over an area of about 70 hectares, with the western zone being the least documented, as it is completely buried below the sand. Even so, other more diffuse traces enable the city's area to be extended. We could consider that an initial plan focused on that area and then later the guidelines were extended towards the west. However, no stratigraphic studies have made it possible to determine without a shadow of doubt which zone may correspond to a Hellenistic foundational monument, since excavating in the low area of the city is quite difficult due to water filtration.<sup>57</sup> We do not know the boundaries and general shape of the Hellenistic settlement because the known section of the wall in the northwest sector of the city appears to be later, as it includes the high necropolis and a whole built-up sector on the northern and western foot of the hill. However, by observing some old aerial photographs we have been able to learn something about the eastern side. The oldest photographs in particular show a very clear contour of moisture in the protected area of the site. (Fig. 2a) The plotting shows without doubt that there was once a structure (now absent) with a significantly geometrical shape, which we interpret as being the first city perimeter. Inside this area we find most of the traces of the parcelling, which has been partially fossilised in the trails that still cross the site today. Based on these signs, we propose the theory of the location of a Hellenistic city, which would have been established at the foot of the hill occupied since the Saitic period. (Fig. 3)

This planned settlement would have had walls which are only documented in Roman times. In fact, a papyrus dating from the 3rd century AD refers to the use of night guards and mentions five gates: the North Gate, the West Gate, the Pesor Gate, the South Gate and the Pses Gate.<sup>58</sup> With these references and

the mention of other unique constructions, it is clear that the list of guard duties includes practically the whole city, with one or more gates on the eastern side missing. To comprehend that absence in the foregoing relationship, it could be considered that there is a gap in the text, or an urban planning interpretation could be applied. In this case, it is significant that the list of guard duties mentions city buildings which, according to Krüger's proposal, run along the eastern side (gymnasium, *tetrastylon* of Thoeris, Thoereion).<sup>59</sup> The depiction of an internal route, ignoring the wall, could indicate the absence of a wall or of gates. In our opinion, the second option is correct (with certain reservations), since an eastern gate is documented at a later period, although it must have been situated much further to the north.<sup>60</sup> An equally interesting fact is the distinction between the northern and southern quays, as if there were no fluvial facilities in the prolongation of the central part of the city towards the river, presumably the most important. The lack of relevance of those gates could be due to the need to protect the fluvial front of the city in the case of serious flooding. The eastern wall could have acted in some way as a fluvial front and a retaining dyke, rather than as an actual wall.<sup>61</sup>

Archaeological documents and papyri allow for the inclusion of all the typical facilities of the Graeco-Roman city inside that walled enclosure: the acropolis, quarters, a gymnasium, royal worship sites, aristocratic homes, markets, baths, granaries and the like. Exhaustive research by papyrologists and historians suggests a relative layout of the monuments and a "virtual reconstruction" of the city that archaeology is as yet unable to confirm. However, the image obtained is that of a large city with no less than twenty quarters.<sup>62</sup> The urban planning sense of the term *amphodon* is dubious and it can be seen that each of those entities could have housed an average of 300 citizens.<sup>63</sup> Nonetheless, perhaps not all of them are included within the walled enclosure, as there is also a hippodrome quarter, which is usually outside the walls. Even so, the urban agglomeration must have experienced certain growth, as there is documentary evidence for the construction of a new street. Moreover, the intersections of the larger streets gave rise to new monuments, such as the *tetrastylon* of Thoeris, which is documented in the papyri. In the south, part of one of those monumental columns that formed part of a *tetrastylon* still

56. Subías 2008, 13.

57. Our excavations in a street with porticoes in the south of the city revealed few finds and a single stratum, thereby making it impossible to evaluate the results with any precision.

58. P. Oxy I 43, 295 AD.

59. Krüger 1990, schematic plan.

60. Foutouh Al Bahnsa, 207.

61. Our thanks to Judith Bunbury for her suggestions.

62. That organisation emerges in the documentation dating from the 1st century AD. Daris 2000, 211.

63. Daris 2000, 213.

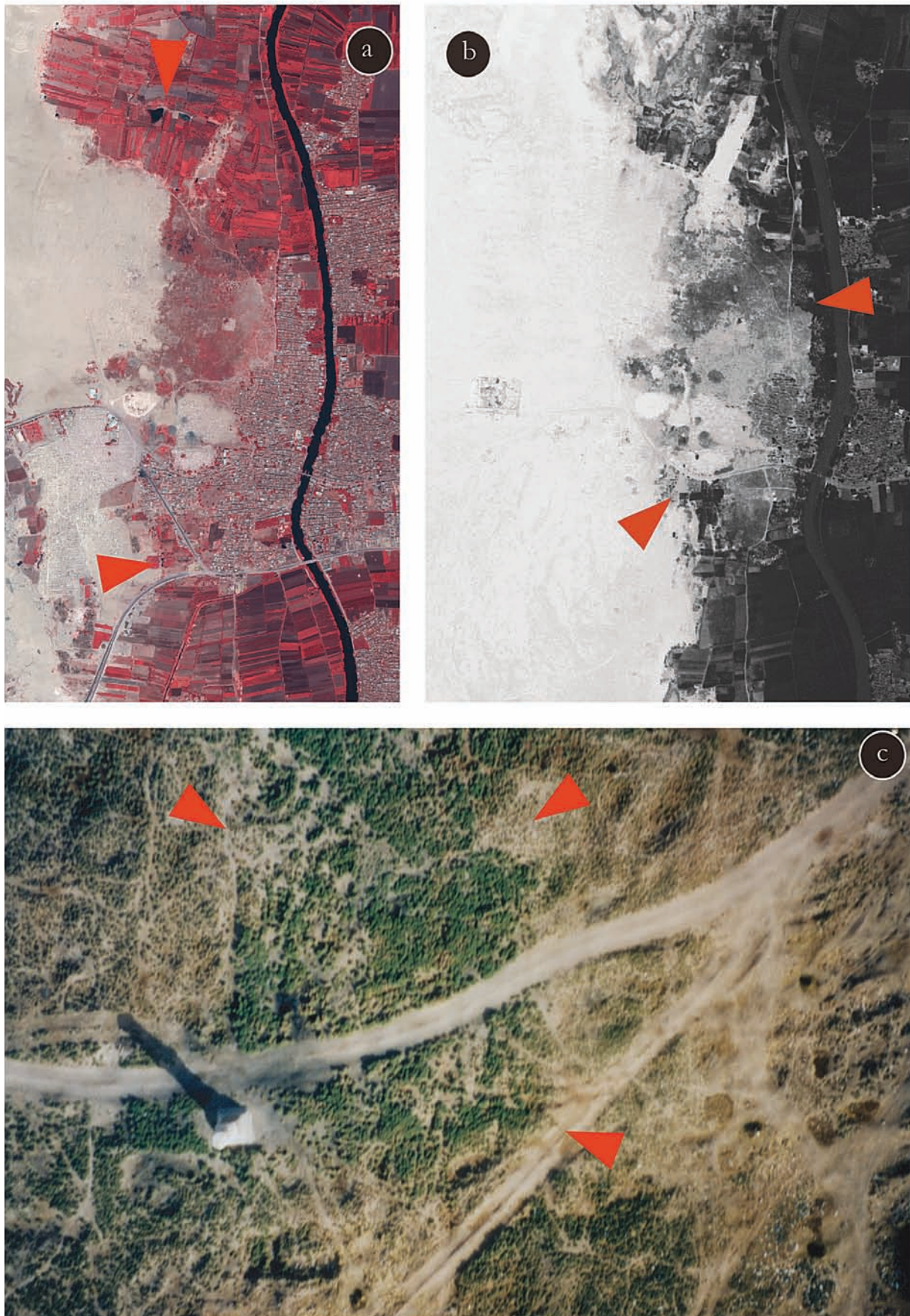


FIGURE 2. Aerial images of Oxyrhynchos: a) satelital image Worldview 2 (23-06-2010) 843 bands, with little lagoons revealing a dyke and trace of a regular pond south of the city; b) satelital image Corona (Id: DS1023-1025DF079, 17-08-1965) with the waterfront position and hypothetical watercourse south of the city; c) shot by kite over the tetrastylon (author: Y. Guichard).





FIGURE 3. Sketch of the Saitic Settlement and Hellenistic urban layout.

exists and in the aerial photographs we can discern three tracks, showing us the width of the larger streets, which is around 30 metres.<sup>64</sup> (Fig. 4)

Also of interest is an *Osireion* outside the city, on another small hill to the west about 39m above sea level, with which a visual relationship is established from the high necropolis. Based on the aerial photographs, that relationship appears to be materialised in a road, which offers us a way of understanding the relationship between the Greek city and a suburban sanctuary along a processional route. The area surrounding the city also has different necropolises from the Graeco-Roman period, with cremation and individual burial sites around the hypothetical route that leads to the sanctuary. Other funeral monuments scattered throughout the zone must have had a monumental appearance, as the many known funeral sculptures indicate an architectural tradition of Graeco-Roman mausoleums. That suburb created around the city, at least during Roman times, generates an unusual space in Egyptian cities, which are usually distanced from their sanctuaries and necropolises.

Be that as it may, the Roman and Palaeo-Byzantine period would contribute to making that suburb denser and giving it its own intermediate sense in the city-territory dualism that was in fact alien to the Hellenistic city in Egypt. During Roman times new territorial concepts, such as the term *proastion*, would arise with reference to the “proximity of the city” or the suburbs.<sup>65</sup> It was only after Diocletian’s reform that the notion of “civic territory” arose, denoting a new relationship as *civitates/territorium*.<sup>66</sup> The appearance of large suburban domains indicates a class of citizen who would not have been willing to give up urban life or the material comforts of their vast possessions. The suburbs would also have been inhabited by religious domains or monasteries, which were also productive units. In this respect, Oxyrhynchos also contributes a very important archaeological find: an estate with a surface area of more than a hectare combining different functions, including a religious one. The size of the complex and the proportion of surface area excavated are not sufficient to be able to determine which of the two options, monastic or palatial, is possible. Neither it would be surprising to find both in a single

enclosure, since the larger families controlled the religious classes.<sup>67</sup> It is tempting to think that there may have been a large *oikos* like the one on the Apion estate, which must have been located in the surrounding area. Also of interest is the mention of a palace to the west of the city, in north Bahnasa, as recorded in the narration of the Arabian conquest of the city.<sup>68</sup>

Finally, around 320 A.D. the term “metropolis” gave way to that of *polis*.<sup>69</sup> This term no longer had its original legal content and simply explained the prestige of the town to which it referred. Other terms were used to enhance most illustrious cities from the Byzantine period, including *lampra* that was also used to refer to the city of Oxyrhynchos, which, in the 6th century AD, was even awarded the title of “Justinian City”.<sup>70</sup> The term *Iustinou Nea Polis* could perhaps allude to another process that can be confirmed in archaeological terms: the establishment of a new quarter in the north-western part of the city. The surface survey and aerial photographs show a land parcelling operation with an oblique orientation, different from the original one, which was later partly replaced by a large curved wall overlooking the western part of the desert. The topographic approximation was made with the assistance of J. Segarra by taking the moisture traces in the walls as a reference. The remodelling of this part of the city during a later period gives certain credibility to the mention that it was divided into two parts, one in the north and the other in the south, at the time of the Arabian conquest.<sup>71</sup> (Fig. 5)

#### 4. Aspects regarding the urban division of Oxyrhynchos

Little information is available about the parcelling criterion of the Graeco-Roman period in Egypt and what does exist is unreliable. The city of Alexandria has been the subject of many different hypotheses. The most recent is apparently based on oblong plots of 1/3 of an *aroura*, while others consider them to have been almost square and measuring 600×500 Egyptian cubits of 52.5 cm.<sup>72</sup> Earlier hypotheses were quite different and proposed plots of 120×100 feet.<sup>73</sup> The use of the Egyptian cubit seems to have been accept-

64. A very long distance, if compared to the proposal of 20 m for Hermopolis. Bailey 1991, 29-32.

65. Husson 1983, 235.

66. Based on the opinion of Bell (1940) p.145.

67. Subías (in press).

68. *Foutouh Al Bahnasa*, 32. We should also invoke the documentary confirmation of an imperial palace dating from the 4th century (P. Oxy. LXIV 4441), recorded by Bowman 2000, 182.

69. Bowman and Rathbone 1992, 245.

70. Krüger 1990, 67 n.90 and Hagedorn 1973, 277-292.

71. *Foutouh Al Bahnasa*, 23.

72. McKenzie 2007, 24. The author says that the Egyptian cubit is used and that the elongated plots correspond to the criterion of occupying one *aroura* with three blocks of surface area, while the new blocks would have measured 600×500 cubits.

73. According to Caruso 1984, the plots would have been 35×60 metres, i.e. 120×200 feet (of 29.16 cm), in a ratio of 1.2: 2, although the deduction was made using 1:5000 mapping as indicated by the author himself.



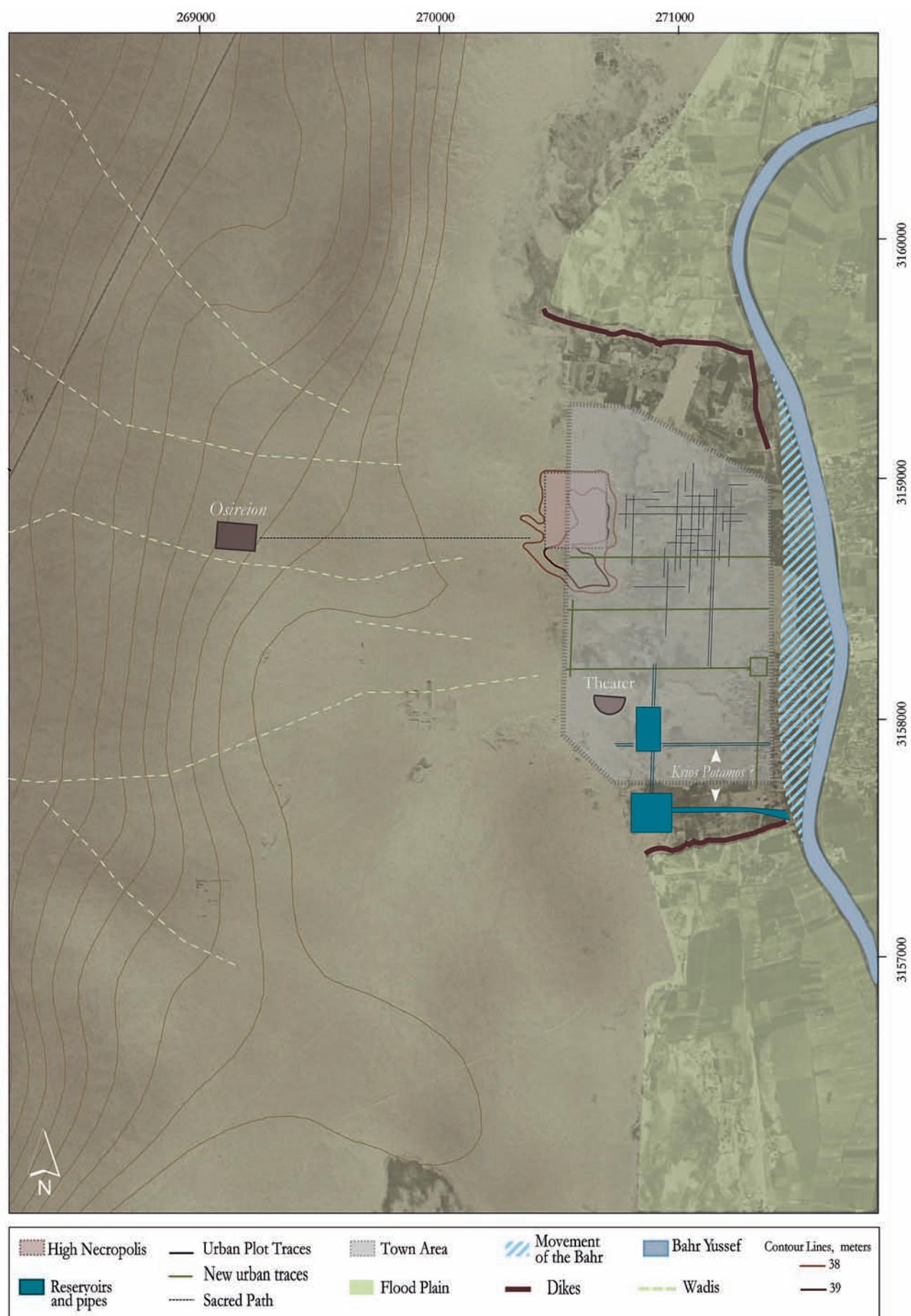


FIGURE 4. Roman extension of the town and hypothetical hydraulic system.

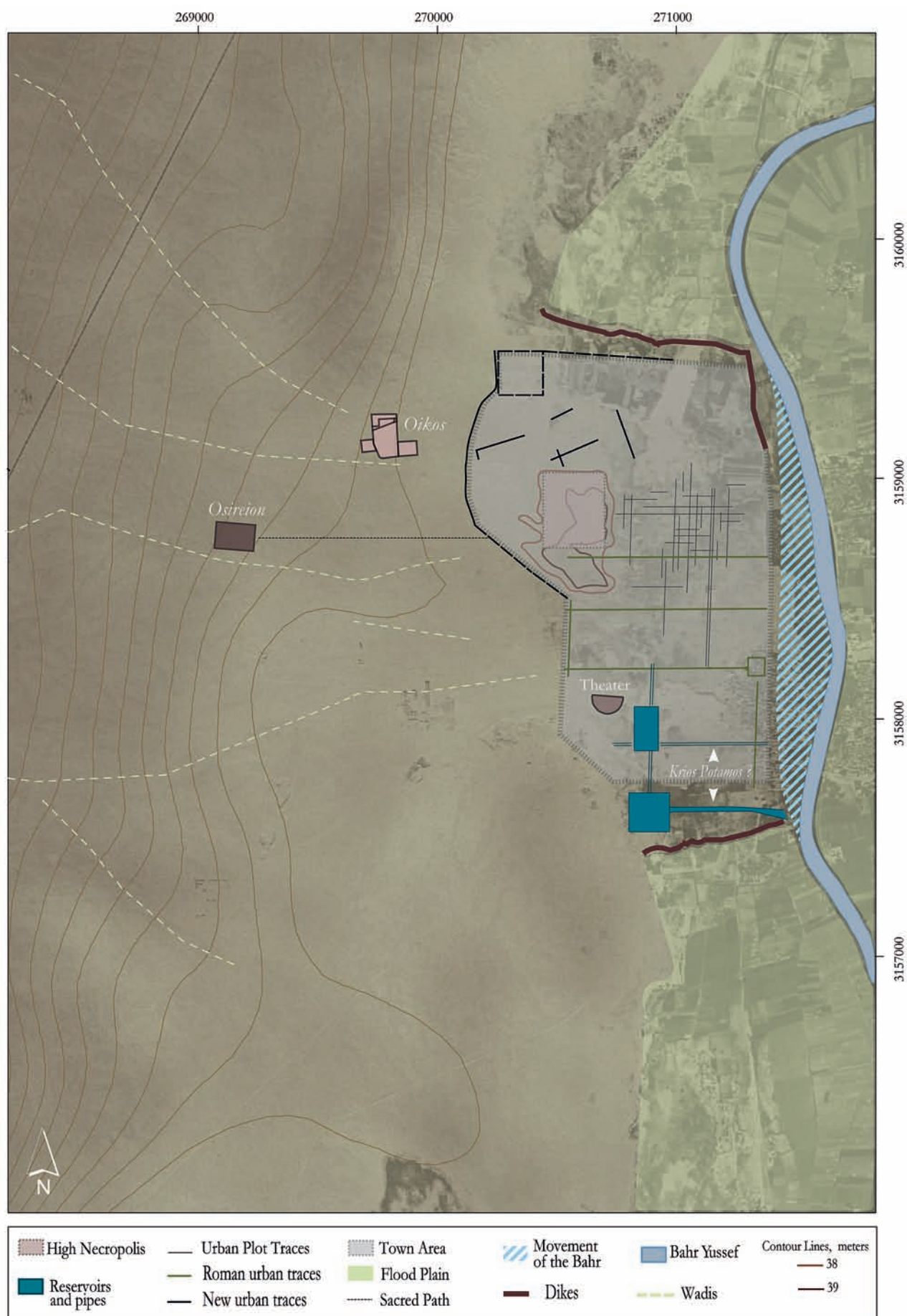


FIGURE 5. Sketch of the Byzantine extension of the town and suburbs.



ed almost unanimously for interpreting the plotting of the graeco-roman cities. An example is Philadelphia where the plots occupy roughly  $50 \times 100$  m<sup>74</sup> and where Judith McKenzie states that the *plinthia* would have measured around  $200 \times 100$  Egyptian cubits.<sup>75</sup> However, the evaluation of that module must be reviewed, as Borchard refers to an area with elongated plots, whereas as Paola Davoli correctly confirms, based on the aerial photographs, that the plots should be regarded as square.<sup>76</sup> As far as I know, no other attempt has been made to study land parcelling in Egypt during the Graeco-Roman period.

Of the cases examined, there is an information gap with respect to knowledge of urban parcelling systems from the Hellenistic period in Egypt, even starting with the measuring unit. As a rule the references to metrology in Graeco-Roman Egypt are quite confusing, due to the duality of the system and the variable nature of the Egyptian *schoinos*.<sup>77</sup> When experts refer to the metrology of the Ptolemaic period, they usually only consider the 52.5 cm cubit and the Ptolemaic foot that stems from it. In the event of doubt, all that can be done is to multiply the measurements systemically and accurately. At present, there are very few references and they appear to be confined to the use of that unit during the Hellenistic period. For example the use of the 0.35 m foot (which has a ratio of  $2/3$  of the 52.5 cm Egyptian cubit) has recently been demonstrated in the construction of the lighthouse, the city's most emblematic monument.<sup>78</sup>

However, the importance of another foot known as the Alexandrian or "Attic" foot during the Hellenistic period in Egypt is shown in Eratosthenes' calculations and by deduction from the work of Hyginus Gromaticus it can be seen that this was the measuring unit used.<sup>79</sup> There are few references to that foot, also known as Cyrenaic, but there are also very few metrological studies of the Hellenistic period. In all cases, its appearance would be prior to the reign of Augustus.<sup>80</sup> Furthermore, that foot would be useful for coordinating the Roman linear measurements, since a ratio of 1 to 8 can be established between the mile and the *stadium*, when it is based on a foot of 30.83 cm.<sup>81</sup> In the calculation of the separation of the parcelling

signs observed at Oxyrhynchos and included in the appendix to this paper, Neus Gasull identifies the Alexandrian foot of 30.8 cm as the measuring unit. If this value is accepted, regardless of its chronology we should also try to understand the interest in using this new unit in urban parcelling.

In fact, whereas the Ptolemaic foot of 0.35 cm maintains a comfortable ratio with the Roman foot for the purpose of making the calculation, the new foot would appear to be a superfluous novelty. Thus, 600 Ptolemaic feet are equivalent to 400 elbows and the diagonal of a square with these dimensions is equivalent to 1,000 Roman feet.<sup>82</sup> The advantages of the Ptolemaic foot in terms of division are clear, since the idea is to obtain simple geometric figures that allow work to be done with areas or surfaces. As other authors have shown, the most important aspect of a colonial land distribution is that the plots have an identical surface area, which sometimes gave rise to different geometrical traces within one planning system.<sup>83</sup> However, from the classical period, urban division is usually orthogonal, meaning that it can be based on linear units. Furthermore, the plot usually has a square shape from that time on, as in Halieis or Rhodes, measuring 1 *stadium* or 600 feet per side.<sup>84</sup> It must be emphasised that a geometrical figure of this type may give rise to an interior subdivision with plots or lots of  $120 \times 100$  feet, which would result in a *schoinos*, the habitual unit of area in Greek cities.<sup>85</sup>

We cannot accurately restore the parcelling of Oxyrhynchos without making new checks in situ, but the regularities observed by Neus Gasull appear to indicate the possibility of regrouping the traces, obtaining modulation rates. Personally, I feel that apart from the proposals analysed by the author, it is also possible to make out blocks of  $600 \times 500$  feet, meaning that we would be in a similar situation to that described for Alexandria, although with another linear measuring unit. I propose a modulation using this figure based on the main lines of the urban landscape of Oxyrhynchos, such as the column of the *tetrastylon* and diffuse lines crossing the city, which I believe to be main streets. (Fig. 6) Thus, a division formula is shown which makes it possible to obtain two elongated

74. Mueller 2006, 116 and following.

75. McKenzie 2007, 24, note 30, based on the old mapping.

76. Davoli 1998, 143.

77. Engels 1985.

78. Empereur 2002, 928.

79. Engels 1985, 308-9.

80. Stazio 1959, 547 and 552.

81. In fact, an inscription from Schedia in the Delta, dated 10-11 AD and written in Greek and Latin, allows it to be established that 250 milliararia were equivalent to 2000 stadia. Kayser 1984, n.15.

82. Guy 1996, 189.

83. Tréziny 1999. In Megara Hyblaea the plots correspond to figures of  $9 \times 7$  or  $8 \times 8$  modules and the general size of the plot is 25 elbows.

84. Boyd and Jameson 1981, 333.

85. *Ibidem*, 335.

*plinthia* in the Greek tradition, as would be the case of Philadelphia. There is a 3rd-century-AD document that allows the area of a plot to be reconstructed, giving rise to a rectangular block.<sup>86</sup>

With respect to another planning characteristic, it appears that a relationship can be established between parcelling and the designation of quarters in the metropolises. We found these topographic names in Egypt at sites where the regularity is feasible (i.e. Alexandria and metropolises from Middle Egypt such as Oxyrhynchos or Hermopolis). The fact that in Oxyrhynchos some twenty quarters make up the main core of the city could be related to another twenty larger urban plots. It is also interesting to note that a relationship can be established between the *amphodon*, another name for a quarter, and access to the water.<sup>87</sup> In fact, the presence of canals crossing the cities, both in Alexandria and in a more modest but regular city such as Philadelphia, favoured geometrical rigour in establishing the underground canals for supplying water from the phreatic level.<sup>88</sup> Thus, for instance, there is a papyrus that refers to a *hyponomos* or underground water pipe in a temple in Philadelphia.<sup>89</sup>

Finally, other canals may have run above ground, such as the one documented in the Fayum in a papyrus dating from the 2nd century BC, which tells of the digging of an urban canal for use by dyers.<sup>90</sup> In the case of Oxyrhynchos the appearance of the term *Krios potamos*, an important topographical reference regarding urban circulation, is significant. It leads us to believe that a bridge would have been needed to cross the canal. Be that as it may, the parcelling must have been matched to the rationalisation of pipes and drainage elements. The same idea is valid for other Graeco-Roman cities in Egypt, such as Arsinoe, and it would be interesting to see how they were integrated into the planning.

## 5. An urban landscape modelled by water?

The image of a green fertile area surrounding Oxyrhynchos transmitted through the mentions made of its vineyards leads us to propose a theory regarding access to and management of water. For this purpose we will increase the scope of our view and try to understand the measures that may have been taken. The

position of Oxyrhynchos is highlighted due to the following characteristics:

1. Oxyrhynchos is located on a site where the desert advances most into the valley, meaning that there was scarcely enough land for cultivation around it. On the other hand, to the north and south of the city there were two farming valleys to the west of the Bahr Yusef, defined by the *potamos* (Tomis) and the foothills of the Libyan Mountain Chain. From the region of Lahun, a wet strip of land is observed at the foot of the mountains, denoting a concentration of moisture arising from the inclination of the valley towards the ends. Certain sections of that strip, which forms the prehistoric bed of the Nile, contains and formerly contained canals or prehistoric canals, fluvial courses and seasonal streams from flooding<sup>91</sup> or *koilómata* to use the Greek terminology.<sup>92</sup> On several occasions, it has been said that there was once a palaeo-course of the Bahr connecting to the town of Sinara.<sup>93</sup>

The land to the south and north of Oxyrhynchos must have been made up of green areas. In fact, in the chronicle of the conquest of the city<sup>94</sup> it is said that the territory of Bahnasa is good, as it benefits from flooding, even during dry years, since the water rises considerably and, moreover, the Bahr receives water from underground springs that provide it with wetlands or running water by segments and give rise to branches of streams. However, to the west the situation is quite different because, as already mentioned, the terrain rises towards the Libyan Mountain Chain. Thus, while near the river, the land would have tended to be isolated from the flood and artificial wells or canals would have been necessary to irrigate the western suburb.

The relief to the west, outside the walls, was rounded, with small emerging hills that must have been important in the past. There was the *Osireion* hill that would have been embellished with trees, a hill to the south of the site where tradition has it that an Arabian victory took place at the time of the conquest (which is still commemorated today with a column) and lastly an elongated crest to the northwest of the city extending for 4 or 5 km and occupied during the late period by religious structures and a necropolis.

Thus, the suburb would have been a green area where vineyards were cultivated and there were funeral

86. Krüger 1990, 73. P.Oxy. 3300.

87. Du Bouchet 2004, 46, in particular a passage from Gallienus.

88. Davoli 1998, 142 includes the mention of early excavation reports.

89. Bonneau 1993, 29.

90. Bonneau 1987, especially note 23.

91. Linant de Bellefonds 1873, 19. For Nili channels, see the in-depth study by Fiz in this volume.

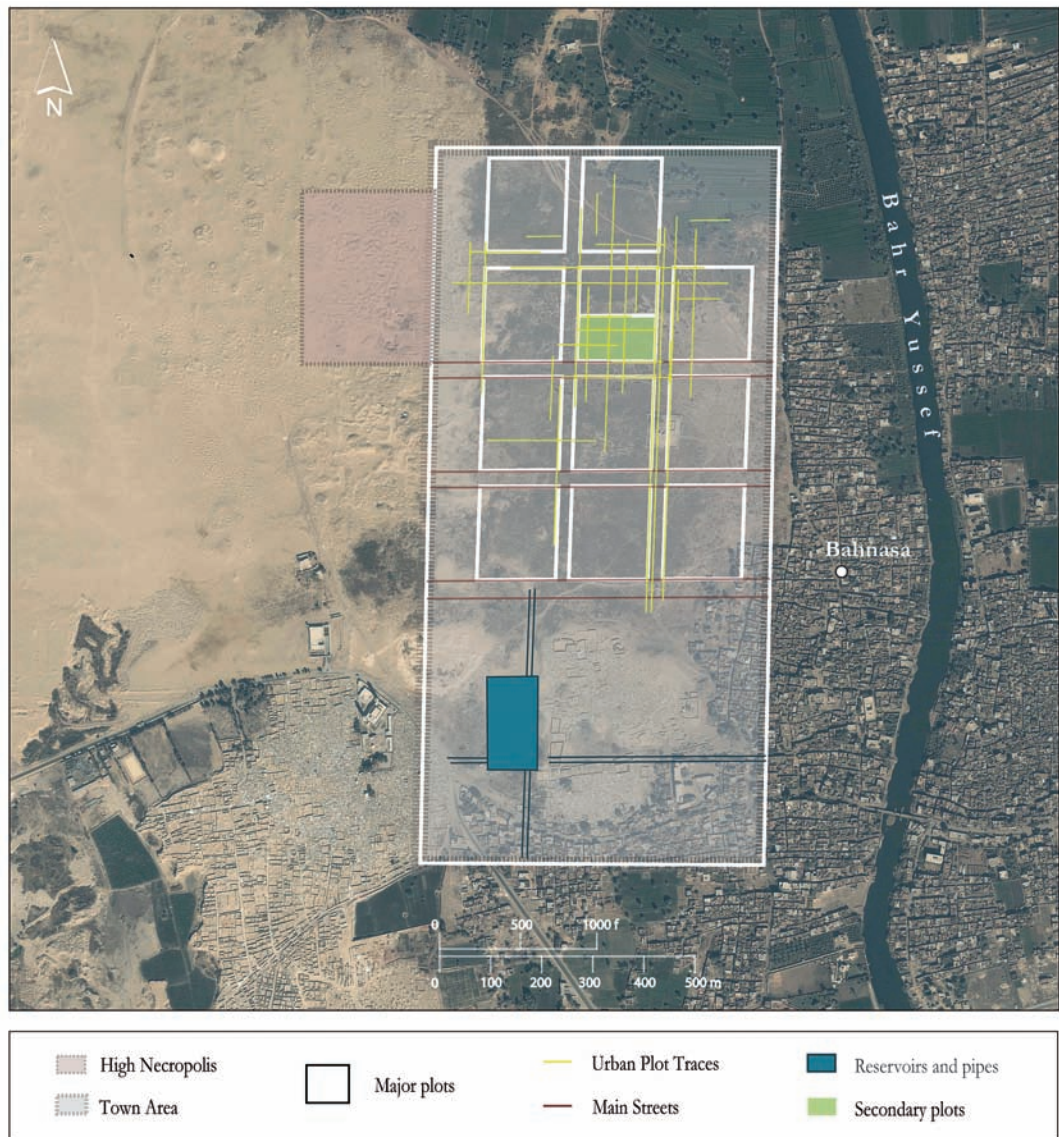
92. Bonneau 1993, 18-19.

93. P.Oxy LI 3638 line 12, to the north of Oxyrhynchos there must have been an old canal located to the west of the Tomis canal, next to Sinara, according to the editors' comment.

94. *Foutouh Al Bahnasa*, 4. Note 4.



FIGURE 6. Suggested modulation of the town based on 500 × 600 ft plots.



gardens in the suburban domains of the most important families.

2. If we look again at the landscape in which the city is set, we see that the shape of the Bahr Yusef at this point is quite surprising, with two meanders that maintain it as a straight line, while the rest of the course shifts towards the east. The general shifting of the Bahr Canal has been highlighted on several occasions, indicating a shift of up to 3 km from the foothills of the Libyan Mountain Chain.<sup>95</sup> To understand that permanence of the course of the Bahr near Oxyrhynchos, we can only imagine that this section was channelled and regularly consolidated. The most plausible explanation is that the project was undertaken at the same time as the city was planned, creat-

ing a fluvial front at the time of its construction in the Ptolemaic period, although it is known that there would have been large longitudinal dykes to hold back the floods, even before the Macedonian conquest.<sup>96</sup>

It should be said that Oxyrhynchos acted as a river port and had extensive dykes (*krepidos*) along its river façade. In fact the city had two quarters named North Quay Quarter and South Quay Quarter, at least during the Early Roman Empire period.<sup>97</sup> The importance of the metropolis as a trading place would have justified this consolidation work executed along a stretch of 8 km. There is still no archaeological record of that project, but the consolidation of canal banks was frequent and gave rise to a specific vocabulary. For instance, a *skelos* is the lower part of a dyke reinforced with trees due to the existence of a river mouth that

95. Butzer 1976, 35.

96. Bonneau 1993, 49-50. The Greek term is *tainia*.

97. Krüger 1990, 79.

requires greater resistance. It is interesting to note that a *skelos* is documented for Oxyrhynchos. This infrastructure gave rise to a small town, *Epoikion Skelos*, from the Paleo-Byzantine period.<sup>98</sup>

3. Graeco-Roman Oxyrhynchos extends partly along the fluvial terrace, where the settlements were protected from flooding but not from the damp. In fact, during years of serious flooding, the subsoil of the zone could be flooded as it is on the prehistoric bed of the Nile. The damp areas perceived today in Oxyrhynchos could have been much larger and longer-lasting than in ancient times, as the phreatic level has risen since the building of the Aswan Dam. However the aerial photographs show how the terrain at the foot of the hill where the necropolis stands, which is the final spur of the Libyan Mountain Chain, is darker and damper than that near the river, which is the result of a section of the valley being inclined towards the ends. According to Bonneau, the *koilas* can be used from the economic standpoint, for instance, by potters who would have benefited from the dampness.<sup>99</sup> In Bah-nasa the mud brick industry was precisely in that area until a few years ago, behind the Graeco-Roman city's theatre, where there is a lake at the foot of what is now the cemetery. On the other hand, we do not know whether that dampness required drainage or channeling work.<sup>100</sup>

4. As mentioned above, in Graeco-Roman Egypt urban channels were quite common for supplying water to the city quarters. For this reason it is no surprise to see that a canal called *Krios potamos* began at the river and crossed the city from east to west.<sup>101</sup> In his hypothetical topographic layout, J. Krüger places the canal to the south of the city and associates it with a series of baths. The baths would have required plenty of water, which suggests that there must have been a tank or a canal near the facilities from which the water could be raised using the appropriate mechanisms. On the other hand, it seems to be accepted that this is an element that in Oxyrhynchos was integrated into the urban planning.<sup>102</sup>

The aerial views of the site show us a series of accentuated traces of dampness and a zone clogged with sand, which leads us to believe that there may

have been a canal crossing the city in the direction suggested by Krüger in the scheme or diagram he drew up based on the directions given in the papyri. That canal would have carried on to the area behind the theatre, the same place where we have described the marks of a tank and wetlands associated with the *koilas* running from north to south in the foothills of the Libyan Mountain Chain. At this point we also observe a rectangular damp shape that leads us to believe that there was a large water cistern or lake there, perhaps a *hypodochēion* or the terminal vessel of a canal. A tank would have been necessary to supply the baths and it would have needed an elevation system for filling the cisterns. In fact it is known that during certain years there were problems in supplying water to the baths. (Fig. 7)

According to J. Krüger, the word *anabatēria*, which suggests the idea of steps, documented in the Oxyrhynchos papyri, means that we can assume that a canal would have crossed the middle of a district in the western half.<sup>103</sup> However, an internal canal that was full during a large part of the year would have been very troublesome in terms of passage, since it would also have required bridges or walkways to cross it. In this respect we could consider that the *Krios potamos* might almost have constituted a city boundary to the south and that the gates in the wall would have been near the canal. In fact, in the above mentioned list of guard duties there is a gate in the wall near the "royal baths", which presumably would have benefited from the water supply of the *Krios potamos*.<sup>104</sup> Therefore, in this case, certain geomorphological traces help to consolidate the image built up by Krüger from the papyri.

The traces to the southeast of the theatre, which we have interpreted as a pool, suggest that the city would have been supplied from the south, in accordance with the logic of the current. In this respect, apart from the mentions of gardens and fountains fed by the water supply system, there is a description of the city at the time of the Arabian conquest that speaks of a large lake in the city centre with water brought from the Bahr Yusef and many references to the idea of palaces with gardens.<sup>105</sup> On the other hand, the aerial photographs show a conspicuous damp site outside the walls to the south, which we could extrapolate to

98. Bonneau 1993, 16-17. P.Oxy 2244, 50, 61, from the 6th and 7th centuries AD.

99. They were depressions that were filled during flooding and water remained in them for a longer time, forming lakes. The idea of the palaeo-canal or dry canal has its own terminology in Greek: *Koilas-Koilōma*. Bonneau 1993, 18.

100. It is significant that in his work Linant de Bellefonds mentions the building of a long drainage channel alongside the Libyan Desert when referring to the subject of the modernisation of the hydraulic structures of the middle valley.

101. The exact meaning of the term is the subject of debate. Bonneau 1993, 71. Krüger 1990, 115-116. Bonneau indicates that the installation of the *krios* corresponds to a lock associated with a distribution canal or *parahysmos*, which allowed the water to be distributed in opposite directions. See also Carruesco in this volume.

102. According to Bonneau 1993, 11. Potamous Kriou has given its name to a street P. Oxy 43 V iii 24 (295 dC).

103. Krüger 1990, 90.

104. P.Oxy 43 v iii, 24.

105. *Ibidem*, 32.





FIGURE 7. Aerial images south of Oxyrhynchos: a) Quick Bird satellite image with suggestion of the position of the ancient wall south of the city, the *krios potamos* and a large, regular pond; b) shot from a kite over the theatre (author: Y. Guichard).



the idea of a large external water tank. We also know that Oxyrhynchos had a vivarium during the Graeco-Roman period.<sup>106</sup>

5. Further to the south of Oxyrhynchos there was a valley, an extensive zone which we know was used during the modern period as a flood area, as in the northern zone. In fact we believe that in ancient times the area to the south of the city must have taken advantage of the flooding to establish a system of basins. A sign of this would be that a water inlet that is normally associated with the flooding system is documented in Greek (*diakomma*) in Pela (Billa-al-Mustagada), to the south of the city.<sup>107</sup>

The systematic flooding of this fertile suburban valley obliges us to search for the traces of a dyke that could have retained the water and protected the city from the floods. To the south, the city planning is difficult to follow, as it is necessary to place the wall with its gates in a relative position, along with the *krios potamos* and a retaining dyke. The traces are difficult to interpret, as they are indirect; our opinion is that the wall was positioned at the end of the group of modern houses, which appears to have maintained its alignment up to recent times, with the position of the *Krios potamos* in the damp area indicated above. The oldest aerial photographs allow us to observe a series of geometrical lines that do not correspond to the modern buildings. (Fig. 2a)

In this topographic relationship, the toponyms *pse* and *pesor*, which appear in relation to the wall of Oxyrhynchos, may give a clue. In fact, we know that in the Fayum, the same toponym, *pse*, is the name of a dyke mentioned in a papyrus.<sup>108</sup> It therefore bears some relationship to water.<sup>109</sup> In the list of guard duties, both names, *pse* and *pesor*, appear to be related to two gates that complete the entrances in the south of the city. We feel that *pse* and *pesor*, rather than being urban gates for the passage of people, are openings related to a water dyke. Imagining an architectural solution for this infrastructure would be somewhat extreme, but there is an indication that leads us to believe that the wall or dyke had a gate or some kind of passage or floodgate for the water. In fact, at the time of the conquest of Bahnsa, the Arabs found an underground passage beneath the walls "...where the

river water runs, near the south gate, that leads to the city market".<sup>110</sup> If this is the case, the wall could have had an exit from the *Krios potamos* to the south, although there are no traces that allow us to suggest a precise path at present. (Fig. 4)

7. It is also interesting to note that the supposed location of the *Krios potamos* of Oxyrhynchos coincides with that of another significant geomorphological line: that of a *wadi* coming from the Libyan Desert. The traces of *wadis* are located along the desert strip and filtered satellite images allow their importance to be accentuated from the dampness standpoint (see the paper by Ignacio Fiz in this volume). Even though it is not important, the trace of the *wadi* that would emerge to the south of Oxyrhynchos has a course that we believe to be significant. It runs near the road that leads from the desert, emerging in the area to the south of the city, near the facilities mentioned above. It is likely that its bed served as a pathway during long dry seasons, although during heavy rainfall the water would have reclaimed it. Although torrential rainfall is not a common phenomenon, it did sometimes cause considerable damage. Antinopolis, for example, took the precaution of channelling that bed at the point where it passed through the city. In Oxyrhynchos we know that some houses installed bronze ducts for the rainwater,<sup>111</sup> so that during certain seasons this solution was used more often than can be imagined. In fact, there seems to have been an increase in rainfall during the Byzantine period.<sup>112</sup> The topographical position of the torrential flood coincides with the southwest corner of the wall. It may be that a decision was taken to reinforce the wall to protect it, or even to change its course, by curving it like the path that encircles the town today, the origin of which is attributed to the site of a section of railway.

8. With respect to the north, we know that the city was protected by a dyke, as in the narration of the conquest in *Foutouh Al Bahnsa*, one of the strategies consisted of destroying the dyke (which they call the bridge, with the same ambiguity that is found in the term *gephyra*). This was apparently near the city, since stones were thrown at the Arabs from the walls as they were crossing the water. Other papyri mention

106. Bonneau 1993, 57; a *lakkos* can be used as a hatchery. P. Oxy 2234, 5 and 15.

107. P.Oxy 3269, 3. Bonneau 1983, 80.

108. Discussed briefly by Préaux 1963, 125, but the meaning of the toponym is not determined.

109. Perhaps it can be related to the "*paasi*" dyke in Memphis, which would be called "that of the ram", translated from the demotic text that is suggested by Leclère 2008, 82 n.396. The author's suggestion creates a new relationship with the previously quoted term *Krios potamos*, since it has been suggested that that duct would have been related to a temple dedicated to a divinity – a ram – or the forked shape of the duct.

110. *Foutouh Al Bahnsa*, 180, own translation based on the French version.

111. According to Bonneau 1993, 32, the term *exombristér* is a sophisticated way of referring to the drainage of rainwater. It is documented at Oxyrhynchos.

112. Butzer 1959, 79.



a bridge that connected the *oikos* and glorious *domus* of the famous Apion family to the hippodrome, which leads us to believe that this bridge was also a dyke or a wall, or even the same thing. It should be remembered that a dyke was usually associated with a canal and that this infrastructure permitted the installation of irrigation using elevation mechanisms in areas far from the flood. Thus, we know that the “*gloriosa domus*” had water-elevation mechanisms. Thanks to the satellite images, we found traces of hydraulic elements indicating the position of a dyke, specifically a series of small lakes which, judging by their shape, correspond to openings in the dykes holding back the waters (*diakopos*).<sup>113</sup> (Fig. 2 b) On the other hand, the traces of walls in the northern part of the city lead us to believe that there was a large structure in the north-western corner, thus providing a coherent image of the defensive system. (Fig. 5)

9. Nothing remains of the Graeco-Roman wall to the east, but it must have existed and it is likely that its proximity to the river would have put it at risk of being eroded. The book *Foutouh Al Bahnasa* mentions, for instance, that on one occasion the river destroyed part of the bank, which led the authorities to transfer the remains of a martyr of the conquest inside the city.<sup>114</sup> In the scheme we propose for the Palaeo-Byzantine situation, the old wall is connected to the dyke retaining the flood water to the north, starting from the traces of paths observed in the aerial photographs.

10. The zone occupied by the city of Oxyrhynchos had a counterpart on the other side of the Tomis, as was often the case during the Graeco-Roman period (Pela-Antipera, for example). Since they were two different towns, the image of each is confused with the other and in the imaginary Late Roman period there is the impression that the city was crossed by the river.<sup>115</sup> Paradoxically, during mediaeval times the city began to shrink, leading to an increase in a *tell* near the river, on the Bahnasa side and on the Sandafa side, with two settlements having the rounded appearance of rural towns. Both towns have the appearance of traditional settlements, ruling out the image and planning of a Graeco-Roman city.

## Recapitulation

This document is supported by pictures from different sources used to detect what we believe to be

the most significant traces and shapes of the landscape from ancient times. In formulating occasional theories about those traces and interpreting them in the light of written references to hydraulic structures, we have constructed a general framework for the analysis of the site of the city and its urban planning system.

Based on that framework, it should be emphasised that as a population settlement for colonising and obtaining the maximum benefit from the Middle Valley, Oxyrhynchos offered the advantage of being easily protected from flooding. This meant that a settlement could be built in the classical style, with urban elements of civic life and suburbs that could be used for necropolises, palaces, gardens, woods and orchards. The city can thus be considered distinctive due to the absence of elements belonging to the Pharaonic tradition, such as canals leading to the temples of the Egyptian divinities.

Even though it is a beneficial position for building a city as far as the Graeco-Roman tradition is concerned, the environmental conditions imposed the need to take certain precautions with respect to channelling the flood waters or even the sporadic torrents from the *wadis*. Thus, it was necessary to build dykes and paths to drain the land while making water available inside the city. Such an intense modelling of the landscape gave rise to the imagined role of water and greenery, also present in the ideal city of the Hellenistic period.

During the ancient period and the beginning of the mediaeval period, the city was able to maintain its structure and use it to its advantage, but the historic changes gradually modified its physiognomy and a small *tell* emerged near the river. That contraction must have been strategic; to protect the city from flooding when the infrastructures could no longer be maintained, which can also be read in terms of new ideas for civic life. The city then underwent a ruralisation process that has continued to the present day, in which the town again emerges as a communications node protected by the desert highway.

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113. Bonneau 1993, 82. *Diakopos* is also an opening made voluntarily which must be repaired with earth after the water has entered it. One is documented at *Paeimis*, where there is also a *diazóma*.

114. *Foutouh Al Bahnasa*, 3, note 7.

115. *Foutouh Al Bahnasa*, 7. The canal crossed through the middle of it “...le canal la traversait en son milieu du sud au nord jusqu’à l’époque de l’Islam...”.

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