Polish Archaeological Mission to Ptolemais

PTOLEMAIS
II

UNIVERSITY OF WARSAW
INSTITUTE OF ARCHAEOLOGY

PTOLEMAIS IN CYRENAICA

RESULTS OF NON-INVASIVE SURVEYS

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Foreword

Non-invasive surveys carried out at Ptolemais are implementation of the concept adopted by Prof. Tomasz Mikocki, who in the introduction to the published in 2006 Archaeological Tourist Guide wrote: "Having been offered a wonderful opportunity to conduct research on one of the most important archaeological sites in the word we have decided to carry out mainly non-invasive works (rather than traditional excavations) in order not to degrade the integrity of the ruined Ptolemais". With this in mind, Prof. Mikocki has set an ambitious program of non-invasive investigations being aware of the fact that the research carried out over a wide area require non-standard measures and prepare a new methodology for this type of work. His idea could be realized thanks to a grant program of the Polish National Center for Science (research grant NN 109 316237), as an interdisciplinary project "Non-invasive mapping of the ancient remains of the city of Ptolemais in Libyan Cyrenaica."

The project, whose results are presented here as a successive volume of the Ptolemais in Cyrenaica series, is one of the largest such projects in the Mediterranean basin. More than 150 hectares of land was surveyed via non-invasive prospecting methods. Due to the size of the area with documented archaeological remains (invisible on the surface) Ptolemais may be counted among the largest sites with such documentation.

In carrying out the research, a local geodesic grid was developed for the entire site with benchmarks fixed to mark squares of 40 x 40 m (1400 temporary points and six base points allowing a transposition of the local grid to any geodesic or geographical coordinate system). The grid may be easily recreated and used both for continued excavations at Ptolemais and for further non-invasive surveys.

On the basis of satellite images and aerial photography performed for the project, ortophotomaps were prepared for an area of 180 hectares. The maps were georeferenced and fed into the spatial information system for the site. Archival maps fed into the system were also georeferenced (including maps and topographical sketches made by nineteenth-century travellers), as was documentation produced in the course of twentieth-century excavations by various expeditions researching the site. The resulting digital database allows for a more detailed documentation of archaeological remains visible on the surface. It is also important that the data fed into the system may be modified with incoming new information about the site, resulting from both excavations and non-invasive surveys.

The basic methods of field measurements were magnetic measurements performed with a proton precession magnetometer and a caesium vapour magnetometer, as well as gradiometric readings using transductors. The geophysical maps illustrating the measurements were developed to offer a uniform graphic representation of the data from different measuring devices. Filters and transformations used in commercial software for graphic presentation of geophysical measurement results were used in addition to algorithms developed specifically to allow for a filtering out of defects resulting from the varied topography. This proved particularly difficult in the case of Ptolemais – a site spread out on terraces over a large area and with mutable lay of the land, as well as varied geological composition, with rock straight under the surface in the south of the city and numerous layers of relics of ancient architecture in the central part. In such circumstances developing a methodology of field measurements and rules for unifying their results into a single system makes for a great achievement in the field of archaeological-geophysical research.

An equally important element is to determine the depth at which archaeological remains are buried and their configuration on the basis of earth resistance surveys – in our case, a series of geoelectrical probes using a Schlumberger measurement system and multi-layered profiles with a dipole or dipole-dipole system. The methodology for measurements of this kind was worked out in the mid-1980s, but was difficult to use in the case of Ptolemais, where a high-resistance sandy layer lies on much of the site's surface and masks resistivity changes in the lower lawyers. For that reason, a special-purpose method of registering measurement results was developed, allowing not only for a successful exploration of layers down to a significant depth (sometimes over five metres below the ground) but also for graphic presentation of the results with the use of commercial software packages (Golden Software Surfer or DW Consulting ArcheoSurveyer) and software for processing electric resistivity tomography data (RES2DINV or RES3D). We could thus develop documentation both in the form of vertical profiles of changes in apparent resistivity and maps of resistivity configurations at different depths of penetration. This is the fullest form of reconstruction of the location of buried archaeological remains.

An important methodological achievement was to develop the rules of integrating the data gained not just through geophysical measurements, but also photogrammetric documentation, aerial photography and satellite images, topographic measurements (including three-dimensional profiling of the surface areas surveyed). The main achievements in this field include the launch of a measurement system to simultaneously register magnetic field intensity and changes in elevation of the terrain surveyed, as well as adapting free-to-use software package AUTODESK MapGuide for the purposes of the research.

Combining magnetic and topographic measurements was previously possible thanks to certain commercial systems, but the location of measurement points and measurement of height could only be defined to within over 10 centimetres (using Differencial Global Position System – DGPS). In the course of the project, we used Real Time Kinematic GPS Measurements – RTK GPS, achieving accuracy to less than one centimetre. At the same time we developed procedures for the RTK GPS instrument to control the work of the caesium vapour magnetometer. The result was both an increase in measurement accuracy and a near doubling of the speed of magnetic prospecting.

Adaptation for the project of the MapGuide software allowed us to develop our own graphic print-outs in a standardised geographic coordinate system (a conventional system with the transformation points defined to allow for any coordinate system to be employed within the global system) on a scale optimal to each stage of the analysis (1 : 5000 for general questions, 1: 1000 and 1: 500 for detailed analyses). The system also allowed for a full integration of the vector data (the results of topographic measurements and models based on photogrammetric analysis of the results of aerial-photography prospecting) with georeferenced raster graphics (data from magnetic and electric resistivity prospecting and ortophotomaps made on the basis of aerial photography). Another positive, which contributed to increasing productivity, was the availability of all the data on the internet.

The aforementioned achievements relate mostly to the applications of non-invasive survey methods. In addition to these, significant progress was also made in studying history of the city at different stages of its development, as well as the role of North Africa against the background of the other centres of ancient civilisation. This allowed for a verification of the existing hypotheses about the history of Ptolemais and setting new directions for future research on this important centre – one of the capital cities of the ancient world. The most important achievement was the determination of the module used in the Hellenistic era for laying out the city and the hypothetical location of the point from which the construction started.

Finally it is worth pointing out that similar documentation in the form of geophysical maps, photographs subjected to photogrammetric methods or three-dimensional models of the terrain has been developed for a number of sites other than Ptolemais, including in the Mediterranean basin. A wide application of non-invasive methods is becoming a standard research procedure. In the case of Ptolemais, however, the data from non-invasive surveys have been supplemented with archaeological commentary and treated on an equal footing with other sources (gained in the course of excavations of textual analysis and epigraphic studies) to reconstruct the past. As a result, a contribution has been made in both archaeological and historical terms to our knowledge of North Africa in antiquity and blazing new trails for research in this field.

In the course of the project, all the remains of the city walls still visible on the surface were documented in a modern way, while invisible relics, whose presence causes deviations in physical properties of the soil which register as geophysical anomalies, were mapped.

The data have been stored on a proprietary server and made available on the internet, thus introducing them to general circulation in the academic world. All the information has been integrated into a single system which allows for the creation of different levels of access and control of their use by authorised personnel.

After mapping the remains invisible on the surface and confronting the data with results of previous excavations, it was possible to develop archaeological commentary regarding such issues as the reconstruction of the city's layout and recreation of the city grid; location, size, layout and function of individual public buildings (theatres, amphitheatre, bouleuterion, gymnasia, temples) and their place in the context of the city's general plan. In continuing topographic research initiated by Professor Tomasz Mikocki, focus was squarely on issues related to the city's planning and organisation of public space and private construction. Hypotheses were also presented for the exact routing of the city walls, location of towers and gates and their links to the existing transport system. Non-invasive surveys provided new data allowing for verification and completion of hypotheses regarding the city's reconstruction at various stages of its development (including the reconstruction after the A.D. 365 earthquake) and the changes in building functions and locations in late antiquity.

In carrying out research on the private construction, the surviving remains of houses uncovered in the course of excavations were discussed in the context of the entire *insulae*. This was possible thanks to the reconstruction of the *insulae*'s layout on the basis of the observed geophysical anomalies. The data allowed for the determination of the size of *insulae*, the width of the chief transport arteries and side streets, as well as the verification of hypotheses regarding measurement scales used in founding the city. They also confirmed the dating of the main activities leading to the city's foundation to the reign of Ptolemy I Soter, that is to the end of the fourth century B.C.

From the point of view of archaeological geophysics, results were obtained to form the basis of extending analyses with a view to an optimal use of non-invasive survey methods at sites with multi-layered architectural remains. Such building remains, dating to different periods and characterised by plan changes in individual structures, shifts in axes and directions of streets and transport arteries, produce anomalies that are very hard to interpret. Such anomalies are in practice impossible to link to specific remains. Even a preliminary analysis of Ptolemais survey results shows that a successful and relatively safe interpretation of anomaly sources can be conducted, if it is based not just on geophysical measurement results, but also linked to results of a wide range of non-invasive methods. By this we mean analysis of satellite and aerial photography, modelling of the terrain on the site, but most of all taking into account the results of previous archaeological work and a thorough analysis of historical sources (epigraphic and literary).

Practically all the objectives set in the project were achieved, albeit with a delay due to the political situation in Libya in 2011, which rendered fieldwork impossible.

The objectives achieved may be divided into three groups. The first concerns analysis of available archaeological evidence, satellite images and cartographic materials (contemporary and archival) to determine the areas set for geophysical measurements within the site. An important element of the activities was the selection of methods and working out of an optimal way to carry out geophysical measurements in such a way as to guarantee the most credible survey results possible in the conditions found at Ptolemais (actions carried out to achieve this included testing of measuring devices and software for processing the non-invasive survey data). In direct connection with this, a proprietary, original system was developed to allow for topographic and magnetic measurements to be carried out simultaneously by linking the caesium vapour magnetometer with the RTK GPS. The surveys were also directed at developing the methodology both of carrying out measurements and the processing of their results.

The second group of objectives was connected directly to the carrying out of field prospecting. This included:

▪ developing a way to plot the geodesic grid and set photo control points (which allow for aerial photography documentation to be processed, including photos taken from the air with the help of photogrammetric programs) to allow integration of the data gathered into a uniform system that not only facilitate preparation of graphic documentation, but also spatial analyses necessary for fuller interpretation of the survey results;

▪ developing a system allowing for controlled aerial photography (with the possibility of sending the image visible on the liquid display screen and taking pictures with the as many visible photo control points as possible);

▪ testing the available photogrammetric software with a view to selecting a package best suited to the conditions at Ptolemais that would allow for transposition of photographic documentation into three-dimensional models and orthophotomaps that could be attached as a separate layer to the system of the site's spatial information system;

▪ testing spatial information software and adaptation for the purposes of the project of the Autodesk MapGuide software package to allow for a uniform graphic documentation that would contain data both from geophysical surveys and from topographic measurements and photographic documentation.

Last but not least, the third and most important group of objectives was related to the archaeological commentary developed for the site. The point was not merely to identify and explain the sources of the observed geophysical anomalies but most of all to provide new information about the site regarding the following issues:

▪ confronting information from traveller reports with the picture of the site based on a full range of non-invasive survey methods;

▪ location of the port and port installations and determination of the places that require verification through excavation (including with the use of submarine prospecting);

▪ recreation of the module used in the Hellenistic era for the planning of the city and the hypothetical location of the point from which the implementation of the plan started;

▪ verification of hypotheses concerning the function of individual structures located via non-invasive survey methods and capturing the traces of hypothetical reconstruction and changes in the street grid in successive periods of Ptolemais;

▪ an attempt to recreate a typical house plan and the rules of laying out *insulae* for residential construction;

▪ verification of hypotheses regarding location of public buildings (including churches and basilicas) in late antiquity;

▪ evaluation of the data gained from non-invasive survey methods for planning further excavations within the *insula* selected by the expedition of the mission of the Institute of Archaeology of Warsaw University and for setting key locations for necessary excavations at Ptolemais.

The project confirms most of all that the application of non-invasive methods makes possible surveys of large areas (at Ptolemais, an area of around 200 hectares was surveyed and detailed geophysical maps were made for 140 hectares within the city walls). Such large-scale research would have been prohibitively expensive with the use of classic excavation methods (it is worth pointing out that the fieldwork conducted over 12 weeks yielded information on an area of nearly 2,000,000 m^2, while the area excavated by the Warsaw University over the period of 2001-2010 amounted to 2,000 m^2).

The archaeological-historical study demonstrated that a correct interpretation of the data gained from non-invasive surveys may to a large extent supplement and expand our knowledge of the archaeological sites under examination while laying foundations for verification of hypotheses regarding history and setting new directions for further research, including classic archaeological excavations.

The presentation of the results (mostly regarding technical aspects) at international conferences regarding archaeological prospecting and preservation of cultural heritage even before the end of the project has led to the situation where the latest wide-area non-invasive surveys come with sometimes extensive archaeological commentary. This is not limited to a simple explanation of the sources of observed anomalies and the evaluation of the degree of their usefulness for planning excavations, but includes an analysis of the results in a wider archaeological context. It should, however, be noted that in general this part of the report tends to be written by the archaeologist commissioning the project and not, as is the case at Ptolemais, by a team of archaeologists who can evaluate the issues in all their complexity.

The ground survey methods developed for the project, which integrate the results of geophysical measurements with topographic measurements and photographic documentation (including aerial photography with the use of a number of devices – aerostats, aerodines or drones) are at present among the standard procedures undertaken in Poland and abroad, especially in the case of surveys for the purpose of cultural heritage preservation.

The system launched in the course of the project to control caesium vapour magnetometer measurements via the RTK GPS system is one just a few such devices in the world (and is certainly unique in Polish archaeology). Commercial systems tend to limit themselves to the less accurate DGPS location system, while those used in mobile devices fail to provide sufficient data to create three-dimensional models of the terrain. The system is at present successfully used at excavations by the Institute of Archaeology of the Warsaw University at a number of sites in Poland and abroad.

At the end we wish to stress that the research could never be carried out but for the hardware grant financed by the Foundation for Polish Science, a loan of equipment and measuring devices by the Archaeology and Ethnology Institute of the Polish Academy of Science and the wide-ranging help from our Libyan colleagues – both the authorities of the Antiquities Departments at Tripoli and Benghazi and the Archaeological Museum at Tolmeita in the person of its Director Faraj Abdul Karim Omran Tahir, whom we owe special thanks.

Krzysztof Misiewicz

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Kazimierz Lewartowski Krzysztof Misiewicz

Searching for an ancient port of Ptolemais

Whilst summarizing the available data concerning the area located directly by the sea, we were aware of its importance in the reconstruction of the process of planning and developing Ptolemais in various chronological stages, as well as determining the historical role of the harbour. It was expected that non-invasive prospection in these circumstances will be difficult, at the same time requiring actions resembling rather underwater archaeology if the aim of documenting visible relics of architecture and various surface finds (which would be the basis for dating) was to be fulfilled.

Even though research of ancient ports in the Mediterranean has a long tradition[1] and in many cases has yielded interesting results, many methodical aspects of such studies to this day remain not fully developed. Despite the identification of more than 3000 ancient ports and harbours in the region[2], A. Raban's opinion from 1991 stating: "the archaeological research of harbours and maritime installations is actually in its infancy (...)" is unfortunately still up to date[3].

During our research we based our approach solely on interdisciplinary works, which should be considered during the examining of port areas. These are specified inter alia in the works of De Grauuwe, who defines a port as: "a harbour is a place where ships can seek shelter. In the concept of "shelter" must be included anchorages, landing places on beaches and ports with structures like, access channels, breakwaters, jetties, landing stages, quays, warehouses for storage of commodities and equipment, shipsheds and slipways for ships"[4]. We assumed that the presence of many of these elements can be determined with the application of non-invasive methods such as analyses of satellite images, aerial images, geophysical prospection, surveying of surface architecture and finds.

We hypothesised that the oldest part of Ptolemais (however it might have been called in that period) was located on a rocky, flat promontory which stretched into the sea at least 300 m in the NW-SE direction (fig. 1). Establishing the historical shape and size of this feature without underwater surveys is impossible due to the fact that it was intensely used in antiquity as a quarry, hence the northern and eastern shores no longer resemble their initial form.

Another problem with the study of this area are modern buildings and obstacles located at the base of the promontory. Our observations collected during

1 T. Georgiades, Les ports de la Grèce dans l'antiquité, qui subsistent encore aujourd' hui (Athenés 1907); C. Lehmann-Hartleben, Die antiken Hafenanlagen des Mittelmeeres, Klio 14, 1923; D.J. Blackmann, Ancient harbours in the Mediterranean, International Journal of Nautical Archaeology 11.2, 1982, 79-104 and 11.3, 185-211; Y. Carmon, Geographical components in the study of ancient Mediterranean ports, in: J.A. Gifford (ed.), Harbour Archaeology. Proceedings of the First International Workshop on Ancient Mediterranean Harbours, Caesarea Maritime, 24-28.6.83, BAR IntSer 257 (Oxford 1985) 1-4; A. Raban, Coastal processes and ancient harbour engineering, in: Archaeology of Coastal Changes, BAR IntSer. 404 (Oxford 1988), 185-208.

2 A. De Graauw, Ancient Ports and Harbours I. The catalogue (Port Revel 2014).

3 A. Raban, Minoan and Canaanite harbours, in: L. Basch – R. Laffineur (ed.), Thalassa. L'Égée Préhistorique et la Mer, Aegaeum 7 (Liège 1991) 131.

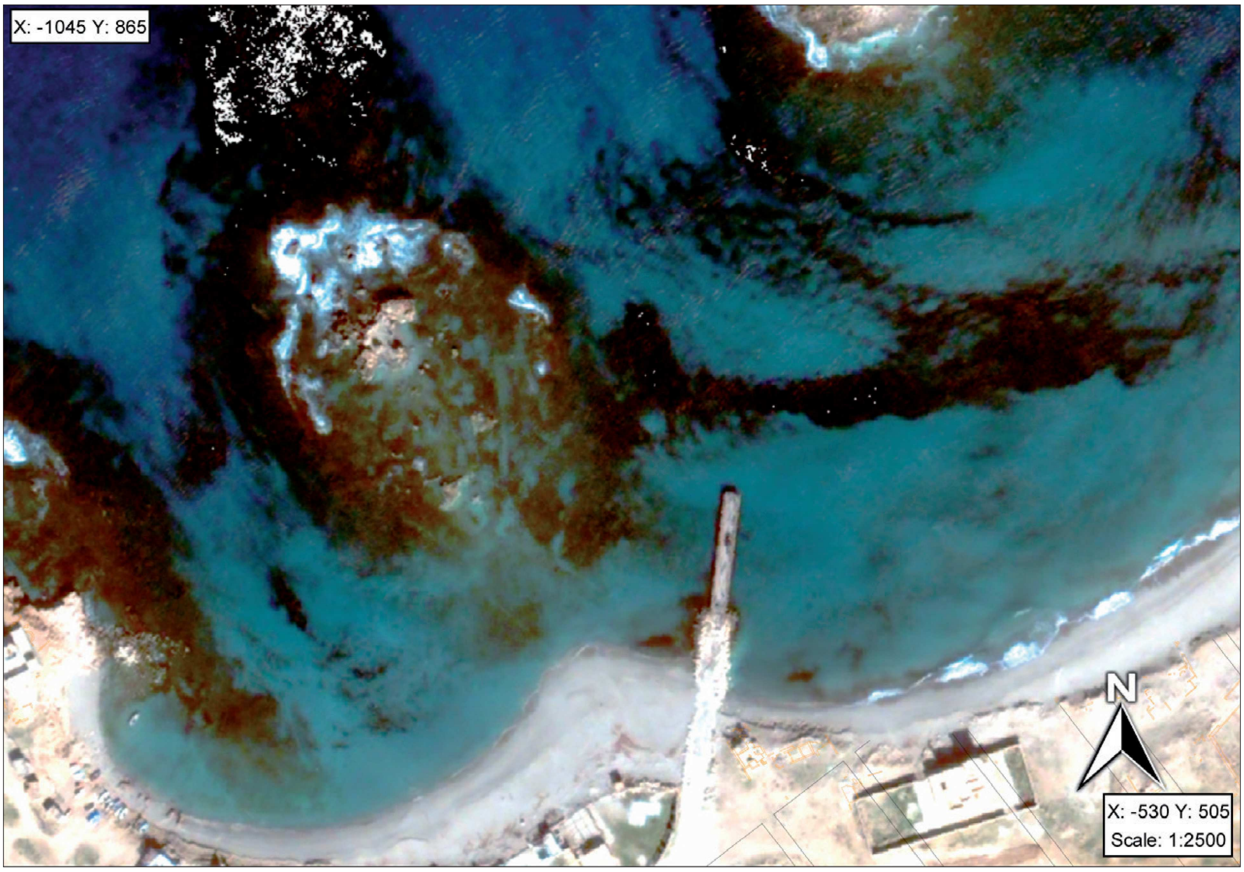
4 A. De Graauw, Ancient Ports..., 29.

■ *fig. 1*

many years of archaeological investigations in Ptolemais regarding mostly antiquity are noted below. It needs to be kept in mind that the region of the promontory was still a booming port up the modern era. Not much has remained from those periods, however relicts of architecture and material culture have been documented. Unfortunately without excavations the dating of these features is impossible. The promontory and its neighborhood were subjected to surface and/or geophysical surveys only.

The possibility of surveying this area with the use of geophysical methods, as mentioned before, was severely limited. One of the problems was the large amount of garbage thrown out on the shore by the sea. These items often contained metal elements, which were the source of dipolar magnetic anomalies, which efficiently masked more subtle anomalies stemming from archaeological features such as remnants of architecture. Test

■ *fig*



fig

surveys with the use of a proton magnetometer in the eastern part of the promontory proved this to be true (fig. 2). Efforts were put into the investigation of the area on the border of the sea shore and modern beach, as it was deemed probable that ancient port installations and municipal architecture could be located there. Unfortunately both magnetic total field and vertical gradient maps only revealed the massive dipolar anomalies from various non-archaeological metal items. Under these circumstances geophysical prospection in the study of the port area was deemed ineffective and further studies took into account remote sensing data from aerial and satellite images completed by the results of field walking surveys..

As a result of these actions, apart from the quarry, features from the Late Roman and Byzantine periods were most clearly visible:

1. Walls going along the eastern edge of the promontory to the modern lighthouse (x: -1046, y: 582). Their best preserved part is highlighted in yellow on the plan, but a line of scattered blocks extending further South may be evidence that this wall originally continued much further.

2. A second, similarly dated wall, visible at the base of the promontory (x: -1093; y: 273). The orientation of this feature indicates that it ran on the western edge of the promontory, although today it is covered by sand, rubble and rubbish, however a number of individual blocks near a modern concrete structure (x: -1126; y: 345) possibly define the further course of the wall.

A bay located east of the rocky promontory (fig. 3) could have also been an ancient port. Currently this sandy beach is occupied by a small fishing harbour and an old ruined Italian period quay. Two rocky islets are located approximately 155 m and 255 m from the beach. The western islet at low tides had formed a small peninsula with the mainland and it is possible that in ancient times this was a permanent aspect of the landscape. It is hard to imagine that this narrow and safe port basin was not adapted in antiquity, however today it is difficult

fig. 4

to assess whether this feature was sufficiently large for a sizeable city. Along the eastern shore several blocks of stone are visible in the water. Some of them, quite impressive in size, fell from the bank during the process of cliff erosion, though some may possibly be the remains of ancient berths.

The use of natural terrain features for the creation of safe, sea sheltered port basins seems highly likely, especially in the early phases of the city. Similarities may be observed with the port in Cherchel, Algeria (ancient Caesarea), where the port area adapted an islet located between two promontories and the rocky coastal area was also used as a quarry. Another analogy is the port in Tipasa, Algeria, utilising two islets (however lacking a promontory). Both of these ports are however of larger dimensions than the one found in Ptolemais[5].

It should be noted that this is the most convenient natural point for the establishment of a harbour on a long stretch of Libyan coast. The nearest locations suitable for a harbour foundation are: modern Benghazi (ancient Euesperides) 105 km to the West and modern Suza (ancient Apollonia – the best preserved ancient port) 106 km to the East.

The western islet in Ptolemais (fig. 4) was also used as a quarry and little remains of its topside, which may suggest that it too once was a promontory. Kite aerial images revealed wall features located on the sea floor between the islet and Italian quay. The first of these features is either two parallel walls (4 m apart) or perhaps two faces of a single wall which formed a massive construction oriented NW-SE. It is located between the x: -825; y: 617 and x:-763; y: 595 coordinates. Another wall extends from the second coordinate perpendicularly in the NE direction over a distance of 15 m. A circular feature is visible in the corner of the wall, which suggests the existence of a circular tower. Near x:-761; y:

5 R.A. Yorke – D.P. Davidson, Roman harbours of Algeria, Underwater Association Report 1969, 10-16.

▪ *fig. 5*

605 traces of another circular structure may be noticed, from which a second large double wall runs parallel to the previous one, in the direction of the islet. While the former disappears under all sorts of debris and sediments, the last wall clearly joins with the circular structures, which makes it probable that these are the remnants of the islands peripheral wall system. Sections of the circular features are short, while a large part of the island's circumference, especially in the southern part, is marked by a clear stripe visible on the remote sensing data and may be interpreted as a negative of a wall. This building is perhaps a remnant of a fort from medieval-modern times. In any case it does not seem to be part of a quay or breakwater system. It can be rather attributed to walls surrounding an isolated area. This is a further argument that the island was once joined with the mainland and only as a result of tectonic movements (most likely earthquakes) and rising sea levels[6], partially collapsed into the water. Further wall features, extending tangentially are visible by the island's former eastern shore. Basing on the available data, the chronology and function of these discoveries remain unknown. We do not even know if they were founded on the see bottom or on the land.

The most extended part of the promontory (fig. 5) was used as a quarry, perhaps in ancient times, and certainly later. What today is the low portion of the terrain, in fact, was once part of the plateau that at one point in time was leveled. Different stages of stone procuring may be traced due to numerous remnants, especially intensely visible in the NE part. A stone feature (x: -1228; y: 530), sometimes considers as a dock, is in fact another remnant of stone exploration, though it can not be ruled out that such form could serve for storage or other activities. A further feature located nearby is rock fragment, cut vertically into blocks which have never been removed from the substrate (a similar feature is visible at x:-1208; y: 452).

A large storage vessel buried in sand accumulated in a bedrock depression as well as two circular cutouts in

6 N. Flemming – C. Webb, Tectonic and eustatic coastal changes during the last 10 000 years derived from archaeological data, Zeitschrift für Geomorphologie, Suppl. 62 (Berlin 1986) 1-29.

▪ *fig. 6*

the rock of unknown purpose (but known from other sites in Cyrenaica according to the information from verbal communication with Libyan colleagues) is also located in this region.

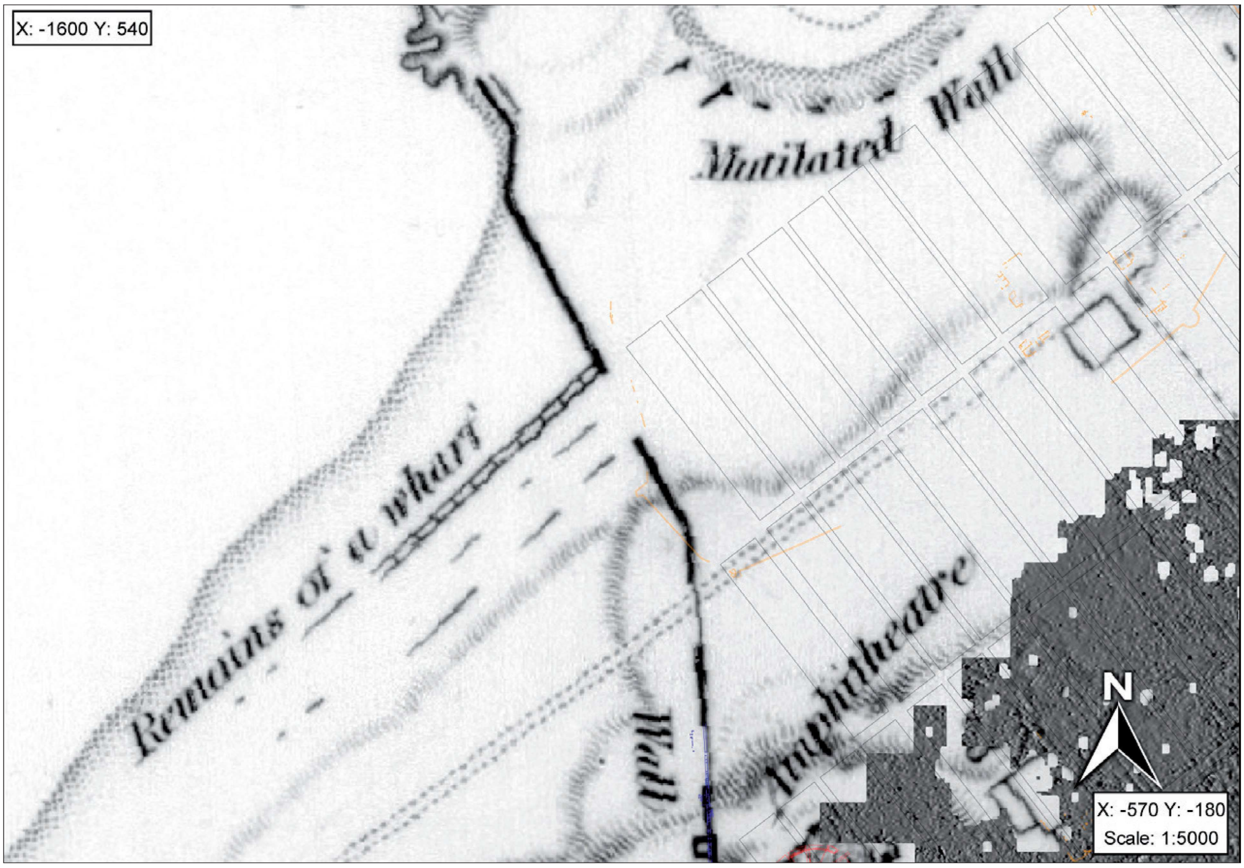
A series of rectangular pits cut into the rock, all having a different orientation is located on an heavily eroded remnant of the promontory's plateau, overlooking the sea (x: -1280, y: 535). These features could be linked to the existence of a necropolis, but their location on the edge of a cape contradict this interpretation. It is more likely that they are reservoirs for goods. One of them is half-way destroyed by the quarry which indicates that they are older than the quarry.

At the foot of the cliff below the modern lighthouse (x: -1053; y: 601) several non-decorated stone blocks and one with an architectural relief were documented. It is likely that they were thrown down during the construction of the lighthouse and belonged to some ancient buildings standing in its place. An element of a highly questionable chronology is a ramp, probably constructed to pull boats and goods out of the sea, cut into the edge of the eastern shore (x: -1020, y: 553). It is heavily eroded which could be an evidence of the features ancient origin but further chronological divagation requires more data.

A quick survey of the promontory's plateau that took place in 2009 revealed that the study area is dotted with stone elements of buildings and huge amounts of pottery sherds from various periods. In some places even fragments of foundations were registered. Most of the pottery sherds are remnants of storage vessels and kitchen ware. A small cluster of thin walled, high quality black glazed ceramics (x: -1138; y: 428, fig. 6) was found. Dating of this find proved difficult based on such meager remnants, but it can not be later than the early Hellenistic Period or perhaps it belongs to the Classical Period. This would be one of the few previously known traces of the first phases of the city. Accidental discoveries of Archaic pottery were made earlier in the area of the promontory. This set of finds undoubtedly belongs to the beginnings


X: -1600 Y: 540
N
X: -570 Y: -180
Scale: 1:5000

▪ *fig. 7a*


X: -1600 Y: 540
Mutilated Wall
Remains of a wharf
Wall
Amphitheatre
N
X: -570 Y: -180
Scale: 1:5000

▪ *fig. 7b*

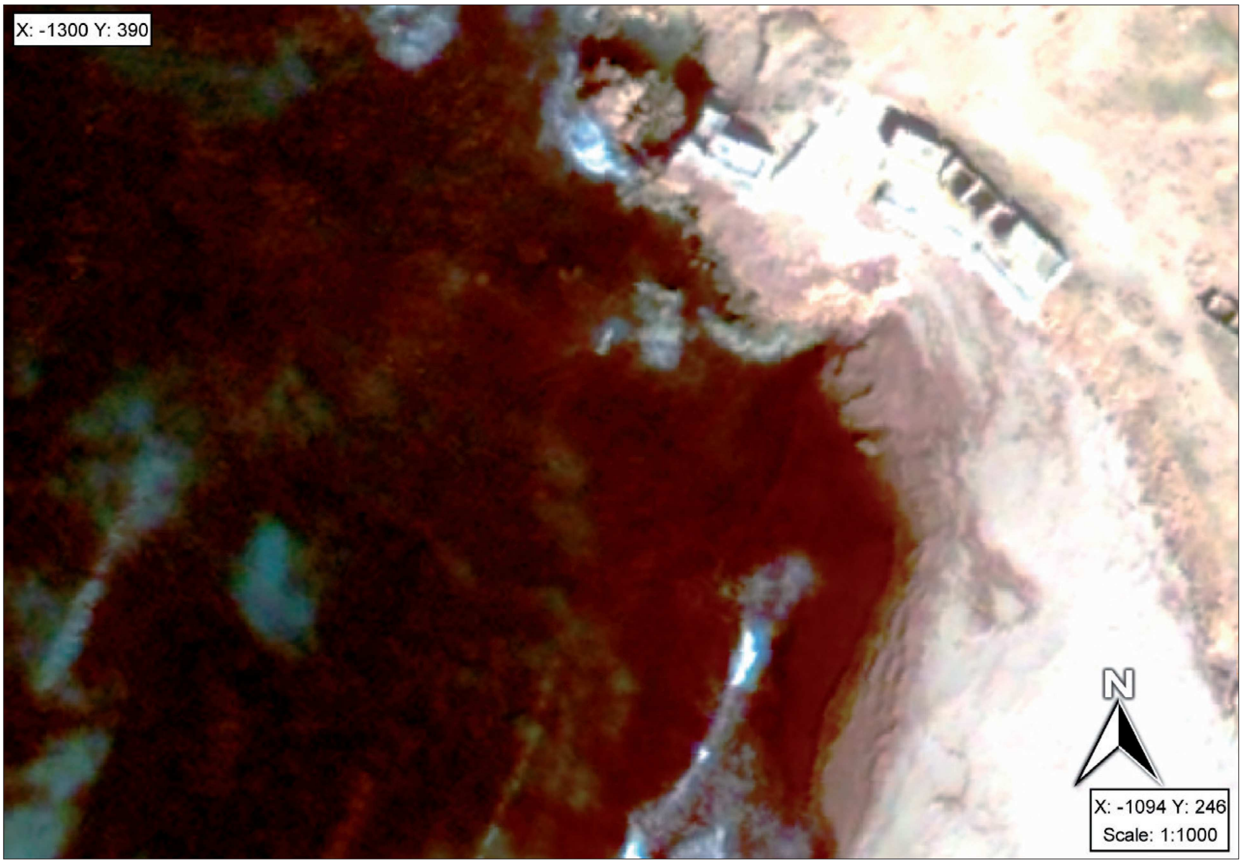


fig. 8

of a settlement which developed into later Ptolemais. It is hard to say whether the earliest housing was located on the studied promontory. It is rather more likely that such activities were located on the eastern bay, which formed a natural safe haven for shipping.

A wide, sandy beach situated West of the cape (Fig. 7) could have also served as a port site. In ancient times, ships were often beached willingly in order to set out their wares for further transport or trade. Such beach sites without larger infrastructure were often also called ports. Today, on this beach, there are not any visible remains of older structures, but historical plans published by travelers who visited Tolmeita[7] show a long structure extending perpendicularly to the Western wall, interpreted as a „wharf" - „waterfront". The terrain configuration was then different than it is today and the beach reached out further into the sea. This is visible on the satellite image, where a reddish shoal stands out. To the West another linear feature reflects a former shoreline, rather than an archaeological feature. The disappearance of this „waterfront" is not surprising in the light of other changes in natural and archaeological topography in the area.

A small promontory is located south of a concrete building, where a few rocks protrude above the sea level (fig. 8). In their vicinity (coordinates x:-1190; y: 310) kite aerial images revealed features not visible on the satellite image, namely clusters of stone blocks. More loose, individual blocks are also noticeable a bit to the South. They may be the remains of buildings or quite possibly sunk transport material. A light, linear feature visible on the satellite image contrasting with the brown background most probably reveals an outline of one of the phases of the former course of the shore.

7 F.W. Beechey – H.W. Beechey, Proceedings of the expedition to explore the northern coast of Africa: from Tripoly eastward, in MDCCCXXI. and MDCCCXXII., comprehending an account of the Greater Syrtis and Cyrenaica; and of the ancient cities composing the Pentapolis (London 1828) 339; G. Oliverio – F. Halbherr, Cirenaica: Luglio 1910-Aprile 1911, Africa Italiana 4, 1931, 254.

Research in the area immediately adjacent to the modern coastline, despite bringing new information about the city's port area, failed to resolve major issues related to the topography of Ptolemais itself. Whether a regular grid of insulae and buildings existed remains an unknown. Modern constructions severely limit the ability to make effective use of the full potential of the application of non-invasive prospecting. Dating of the construction visible on the surface is also problematic. There is also the threat of new building investments, especially intensified in recent years, which leads to the chaotic development of many new structures erected on deep foundations which have a severe, negative impact on the state of preservation of archaeological features.