Dimitris Drakoulis [*]

The study of late antique cartography through web based sources

Summary
The study of sources concerning the cartographic production of late antiquity and in particular mode of late roman cartography was before the spread of the World Wide Web (WWW), a privilege for certain scholars, capable of visiting specialized libraries worldwide, in order to consult original codes and manuscripts. The World Wide Web (WWW) is the most recent medium to present and disseminate information and in particular mode geographical and historical data. In this process, the reproduction of written and depicted primary sources and especially historical maps plays a key role and has multiple functions. First, gives the possibility for studying the document in totality, providing insight into patterns and relations, which could not be observed otherwise, for example, through the printed reproduction of a codes fragment in a secondary source, or through the temporary eyeshot of the original or his photographic reproduction in the library. Secondly, because of the nature of the WWW, the historical map can also function as an interface or index to additional information. Geographic locations on the map can be linked to magnification of the particular, to the original and (or) the translated text, to settlement plans, photographs, sound or other contemporary maps (multimedia). The corpus of late antique cartography comprises depicted documents (*itineraria picta*) and sources in written form (*itineraria scripta*). In the category of depicted documents belong the *Tabula Peutingeriana*, the Dura Europos parchment, the illustrations of the *Notititia Dignitatum* and the *Corpus Agrimensorum*, the mosaics of Nicopolis, Epirus and Madaba, Jordan, the drawings from the manuscripts of Cosmas Indicopleustes, etc. In the category of written sources belong the texts from the manuscripts of the *Corpus Agrimensorum* (*C. Arcerianus, C. Palatinus Vaticanus, C. Laurentianus),* the *itinireraria scripta* (*Antonini, Burdigalensis, Egeriae*), the writings of *Christian Topography*, etc. The case study of several internet based websites with content, related to the above-mentioned corpus, will explore the virtues of various modes of visualisation, test the effects of low-resolution screen readability and examine problems and solutions concerning digital representation and the further study of late antique cartography.

Introduction

The study of sources concerning the cartographic production of late antiquity and in particular mode of late roman cartography was before the spread of the World Wide Web (WWW), a privilege for certain scholars, capable of visiting specialized libraries worldwide, in order to consult original codes and manuscripts.
The WWW is the most recent medium to present and disseminate information and in particular mode geographical and historical data. In this process, the reproduction of written and depicted primary sources and especially historical maps plays a key role and has multiple functions. First, gives the possibility for studying the document in totality, providing insight into patterns and relations, which could not be observed otherwise, for example,

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[*] Architect - Planner, Aristotle University of Thessaloniki, Greece. [drak@arch.auth.gr]

through the printed reproduction of a codes fragment in a secondary source, or through the temporary eyeshot of the original or his photographic reproduction in the library. Secondly, because of the nature of the WWW, the historical map can also function as an interface or index to additional information. Geographic locations on the map can be linked to magnification of the particular, to the original and (or) the translated text, to settlement plans, photographs, sound or other contemporary maps (multimedia). The case study of an internet based websites with content, related to late antique cartography, will explore the virtues of various modes of visualisation, test the effects of low-resolution screen readability and examine problems and solutions concerning digital representation and further study.

In order to classify the sources, a web model concerning map classification has been followed. It distinguishes between static and dynamic web maps. Each of these categories is further subdivided into view-only and interactive maps. The most common map found on the WWW is the static view-only map. Often the sources for these web maps are original cartographic products, which are scanned and put as bitmaps on the WWW. Static maps can also be interactive. These are the so-called 'clickable' maps. The map can function as an interface to other data. Alternatively it could allow the user to define the contents of the web map by switching layers off or on. The WWW has several options to display dynamic processes via animations. The so-called animated GIF can be seen as the view-only version of the dynamic maps. Interactive dynamics can be created by Java, JavaScript or via virtual environments in VRML or QuicktimeVR. (Fig. 1).
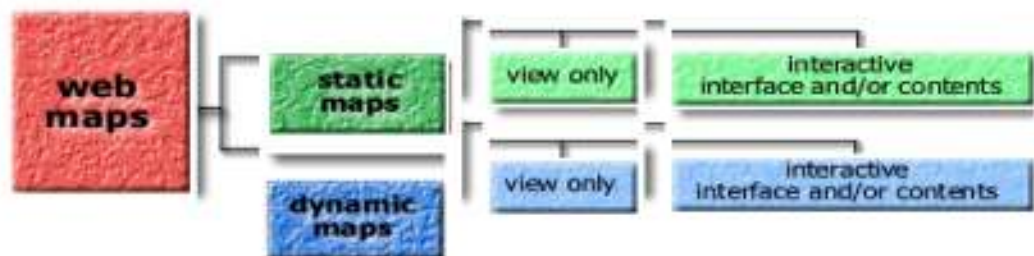

Figure 1. Webmap Classification
(Source: http://kartoweb.itc.nl/webcartography/webmaps/classification.htm).

Presentation

Late antiquity is considered as a relatively autonomous historical period, that according to certain scholars[1] is extended from 200 A.D. to 700 A.D., while according to others[2], it is encompassed from 395 A.D. to 600 A.D.. The corpus of late antique cartography comprises two categories of sources: sources in written form (*itineraria scripta*) and depicted documents (*itineraria picta*). The *itineraria scripta,* compiled in Latin, were works designed to provide assistance for travelers. They recorded a network of itineraries over a vast area and listed the cities and stations on the routes that crisscrossed the empire, to-

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[1] Brown 1989: 10-11.

[2] Cameron 1993: 5-7 .

gether with the distances between them. The *Itinerarium* of *Antoninus* deals with the land and sea routes from western into Eastern Europe, from Gadeira (Cadiz, SW Spain) to Caesarea in Palestine and from the Crimea to Alexandria. It must have taken its final form between 280 and 290 and is thought to be based on the figures provided by the department responsible for the *cursus publicus,* the roman imperial road office.[3] In the early Byzantine period, especially after the 4th century, with the barbarian raids and in particular, the founding of Constantinople, a more general need emerged for knowledge of the world: for travel, itineraries, and cartographic descriptions. To the political and economic incentives was now added the desire of the pilgrims of the new Christian world to travel east to the Holy Land.[4] The *itinerarium Burdigalensis,* dealing with the route from Bordeaux to Jerusalem records also the cities, towns, stations (*mansiones*), and points where horses could be changed (*mutationes*), and was drawn up in 335. [5] Another known Christian itinerary is the *Itinerarium Egeriae ad loca sancta[6]* , made by the pilgrim Aitheria from Spanish Galicia in the 380 A.D.[7]

The *itineraria scripta* were closely associated with the production of road maps. According to the military manual of Vegetius (383–395), military commanders possessed *itineraria* that not only were written *(scripta)* but also contained drawings in color (*picta*)[8]. These maps were used with a multitude of functions, including the use of maps as cadastral and legal records, as aids to travellers, to commemorate military and religious events, as strategic documents, as political propaganda and for academic and educational purposes.[9] Also, the display of world maps was part of an ideology of extended rule, used both by the emperor Theodosius II at Constantinople, in the 5th century, and later by Pope Zachary II in the Lateran Palace at Rome, in the 8th.[10]

The above-mentioned corpus is not represented in the WWW in his totality. Concerning the written sources, the *Itinerarium Antoninii* is absent, so one has to individuate it in its published form, while the Christian itineraries are present, published from *Cristus Rex,* the Vatican Portal in the Web.[11] From the category of depicted sources, only two such "illustrated" maps have survived to the present day: the first is the *Tabula Peutingeriana*

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[3] Miller 1964: LIV-LV.

[4] Avramea 2002: 65-72.

[5] Dilke 1985: 128-129.

[6] http://www.fh-augsburg.de/~harsch/Chronologia/Lspost_04/Egeria/ege_it_00.html (12/04/2005, Bibliotheca Augustana)

[7] Cardini 1987: 333-341.

[8] Vegetii epitoma rei militaris III,6), *Primum itineraria omnium regionum, in quibus bellum geritur, plenissime debet habere perscripta, ita ut locorum interualla non solum passuum numero sed etiam uiarum qualitate perdiscat, conpendia deuerticula montes flumina ad fidem descripta consideret, usque eo, ut sollertiores duces itineraria prouinciarum, in quibus necessitas gerebatur, **non tantum adnotata sed etiam picta** habuisse firmentur, ut non solum consilio mentis uerum aspectu oculorum uiam profecturus eligeret.* http://www.fh-augsburg.de/~harsch/Chronologia/Lspost04/Vegetius/veg_epi3.html#n1 (12/04/2005, Bibliotheca Augustana)

[9] Dilke 1987: 252-57.

[10] Brodersen 1999:557.

[11] http://www.christusrex.org/www1/ofm/pilgr/bord/10Bord01Lat.html

(*Codex Vindobonensis* 324) and the second, the so-called *Dura Europos* parchment (Paris, Bibl. Nat., suppl. Gr. 1354.5), which is absent in the Web and can be found only in analogue form.[12] We have chosen as case study, a static view-only map, namely the digital publication in the WWW of the *Tabula Peutingeriana,* made by the *Biblioteca Augustana* of Augsburg University.[13]

Tabula Peutingeriana

The object of the study is focused on the cartographic genre of *itineraria picta* and more specifically on the *Tabula Peutingeriana,* a road map prepared in order to show the roads of the empire over a total distance of 104,000 km. The original map was compiled between 335 and 366, but it was based on older sources and on information provided by the late roman *cursus publicus* office. It also contains subsequent additions.

The *Tabula Peutingeriana* (Cod. Vindobonensis 324) is a long narrow parchment roll, 6,75 m long and 34 cm wide, that constitutes the more complete copy of depicted travelling guide that has been come to us. It contains the network the main roads (about 100.000 km), the network of settlements, of overnight stations (*mansiones*) and stations of horse changing that were found in the routes that crossed the late empire. A number of natural and cultural characteristics are also recorded, such as, rivers, mountains and forests, distances between nodes, public buildings, holy places, thermal baths, etc.[14] The digital copy of the *Biblioteca Augustana* emanates from 1888 Konrad Miller's publication and has two advantages: first, it is divided in 14 individual parts, representing in sequence the fragments of the map, a choice, that makes the study easier and the screen readability of text and graphics acceptable. Secondly, being a static view-only bitmap map in a scale 1:2 and in a resolution of 150 dpi, it obtains the original dimension in acceptable quality in the standard screen resolution of 72 dpi, especially concerning previous analog publications. Of course, in order to obtain more readable magnified details it is possible to re-sample the bitmap at print resolution of 300 dpi, crop them at the desired dimension and present them as second level hyper-text links. A choice has been made to select fragments of the map that correspond to the geographic regions of Balkan Peninsula, in order to limit the width of the study. In regard to the representational system used in the map, we have grouped our observations in three levels of geographical space: interregional, regional level and urban level.

Interregional level

The main interregional axes of the road network in the Balkan peninsula in late antiquity were two: first, the diagonal military road, the *via militaris,* also called by the Byzantines 'imperial road' (*Βασιλική Οδός*), ran from northwest to southeast and was the principal axis connecting Constantinople with the West. This road was the continuation of the great

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[12] Dilke 1985:113-129.

[13] http://www.fh-augsburg.de/~harsch/Chronologia/Lspost03/Tabula/tab_intr.html (09/03/2006)

[14] Dilke 1987: 238-42.

military highway that began on the shores of the North Sea, ascended the valley of the Rhine, passed through Milan and Aquileia and then descended the valley of the Drava to cross the Sava River at Sirmium (Mitrovica). Then, passed through Singidunum (Belgrade), Viminacium (Kostolac) and Ratiaria. There it turned south along the valley of the Margos (Morava) to Naissos (Nisˇ) and southeast in the direction of Serdica (Sofia). From Serdica continued, along the left bank of the river Hebros to Philippopolis (Plovdiv), continued to Hadrianopolis (Edirne) and from there through Heraclea (Perinthos) in the Propontis to Constantinople[15] (Fig. 2).
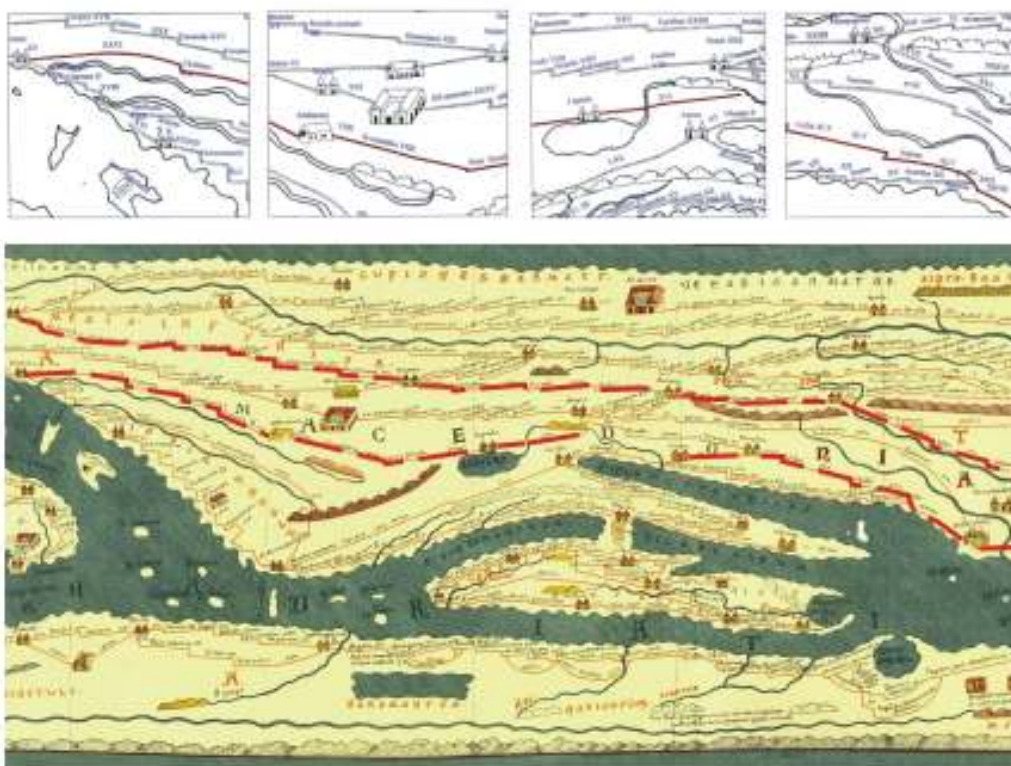

Figure 2. The studied fragments of the *Tabula Peutingeriana* – west part
(Source: Fasolo 2003: 72, Miller 1888, Biblioteca Augustana, Augsburg).

The second most important road axis, the *Via Egnatia*, ran crosswise through the Balkans and provided communications between the Adriatic, the Aegean, and the Propontis, between Rome and Constantinople. It was an extension of the *Via Appia* from Rome to Brindisi. From that port, travelers crossed by sea to Dyrrachion and *Apollonia* and then on to *Clodiana*, passing various stations on the way around Lake Ohrid to the north, entering Macedonia toward Thessalonike. It passed through *Lychnidos* and Herakleia Lynkestis (Bitola) and continued passing Lake Vegoritis and descending the upper valley of the Aliakmon to Pella. From there it crossed the Axios and the Echedoros (Gallikos) River before arriving at Thessalonica. Then it followed the Lakes Koroneia and Volve before continuing to Apollonia and Amphipolis. After that it crossed the lower course of the Strymon river and the north slopes of Mount Pangaion on its way to Philippoi, after which it

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[15] Avramea 2002: 65-72 and Avramea 1976

headed south toward the sea again, reaching it at Neapolis (Kavala). After Neapolis, the Via Egnatia headed northeast, through Akontisma (3 km from modern Nea Karvali) and turned inland to Topeiros, where the Nestos River was crossed. Then continued eastward along the coast to Traianopolis and through Heraclea arrived to Constantinople[16] (Fig. 3).
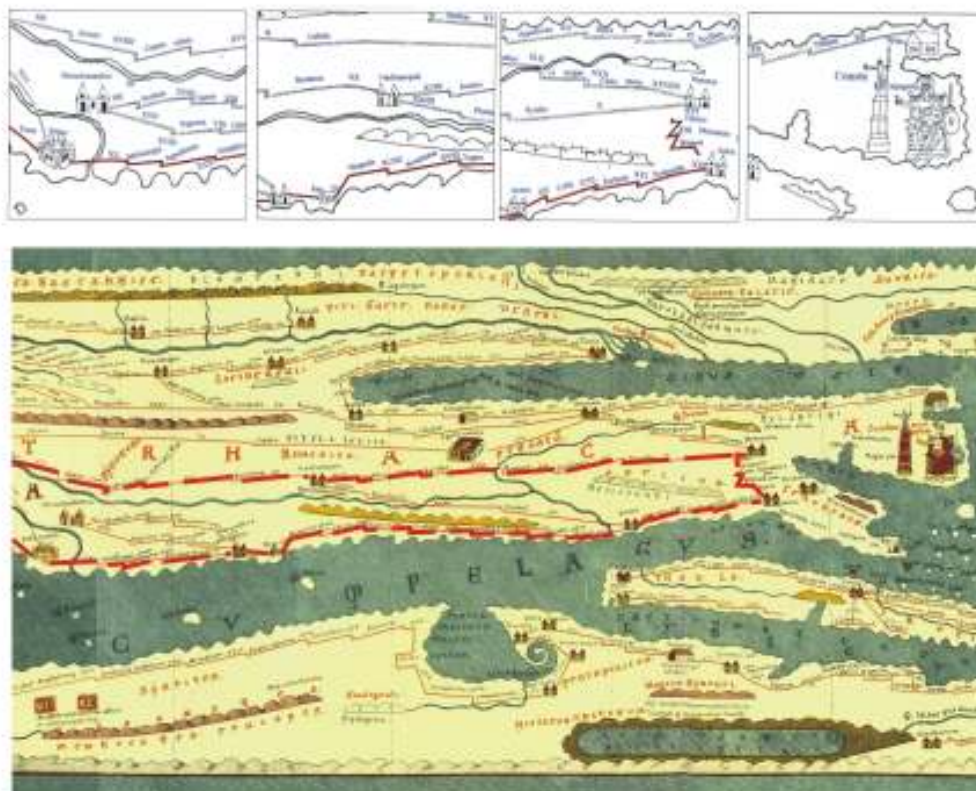

Figure 3. The studied fragments of the *Tabula Peutingeriana* – east part
(Source: Fasolo 2003:73, Miller 1888, Biblioteca Augustana, Augsburg).

Regional level

1. The borders of the Roman Empire in his northern regions correspond to the flow of the river *Danubius*, while the eastern limits correspond to the flow of the river *Tigris*. In fragment XI, westwards the Euphrates river we find the text " *Areae fines Romanorum*" (end of roman limits) that is followed by representations of Mesopotamia, Persia and India. A number of natural characteristics are represented also in graphic form, for example, mountain ranges (*Monte Taurus),* rivers (*fl. Danubis, fl. Nilus*), Seas (*Adriaticum*), gulfs (*Sinus Corinthus*). The administrative organization and the borders between the provinces of later empire are not represented, while instead of these are entered geographic localities and regions (e.g. *Bithynia*) (Fig. 4).

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[16] Koder 2001: 96-99 and Spieser 1984: 21–24.

Figure 4. Natural and cultural features.

2. The road network is represented with red distressed (zigzag) line, that denotes the corresponding changes of horses, with distances between stations, expressed in roman miles (*milia passus* = 1,4815 km.) for all the territory. Exception constitute the regions of Galatia, measured in galloroman leyges (*leugae* = 2,222 km), the regions of the Persian empire in parasangas, (6 km.) and India expressed where the distance are in Indian miles (2 km).

3. There exist 3 cities of first level, *Roma*, *Constantinopolis* and *Antiocheia*, represented as female incarnations, *Tychai* of the cities, that constitute the three capitals – imperial residences of the Empire. A possible chronology is the simultaneous existence of three capitals, that corresponds to the period of the successors of constantinian dynasty and more specifically the period that the 3 sons of Constantine the Great, (Constantine II - Constantius II and Constas 337-38 A.D.) co ruled the empire for 9 months[17] (Fig. 5).

Figure 5. The three first level cities.

4. There exist six 2nd level cities, which are represented in the form of fortresses with walls, bastions and deferring number of towers. These are: *Aquila* (with 7 towers and a big residential complex), *Ravenna* (5 towers), *Thessalonica* (5 towers), *Nikomedeia* (8 towers), *Nicaea* (6 towers and a temple or basilica) and *Ankara* (7 towers) (Fig. 6).

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[17] Fowden – Athanasiadi P. (1978), "The successors of Great Constantine" (in greek), JEE, Athens: Ekdotiki Athinon, p. 43-58.

We have to note the absence of *Alexandria* which is represented with the use of a big lighthouse as symbol, but without a name, fact that is considered a copyist's error.

Figure 6. The six second level cities.

5. Most of the pictures represent 3rd level cities, provincial capitals (*metropoleis*) and important commercial centers. (Fig. 7) They are portrayed with two towers, but there exist, between them, iconographic differences which can be categorized in two sub-classes: a) Those with 2 towers with a *cupola* and knots, called *emporia*, e.g. important commercial turning-points and harbours on the basic communication roads. E.g. *Megara* in Greece, an important passage, *Patras*, central harbour for ships and troops and *Elateja*, known for her importance in the 4th c. A.D.. (Fig. 8) In Thrace, *Fons Col.* close to *Neapolis* (Kavala) in the *Via Egnatia*, in the *Mysiae*, *Sardice* (Sofia), *Tomis* in the junction of Danube with Pontus Euxeinus, in Crete the important port city Cydonia, in Arabia *Petris* (Petra), in Asia Minor, *Amaseia*, in Syria, *Europus*. b) 2 towers with a circular environment, eg in Italy, *Lucca, Mediolanum, Placentia, Altino, Antium, Ostia Eterni, Castra Minervae*, in Dacia – *Sarmategte* and others. (Fig. 9)

6. As harbors are characterized about 20 places (*Portus*), however, depictions do not exist. Exceptions constitute the two harbors of Rome, the *Portus Claudius* and the *Portus Traiani*. The first, exterior harbor that later was used only as space of reception of boats they were separated from the interior with a peninsula with the imperial *Palatium*, the theatre, the baths and the *Forum*. The interior harbor was delimited by the deposits of unloading of boats and a gallery (*porticus*), that was renovated by Constantine the Great.[18] With simpler representations are portrayed the passages between Europe and Asia, in present day Istanbul: *Sycas* in Europe), *Chrisoppolis*, in the Asiatic side (Fig. 10).

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[18] Krautheimer 1983: 7-40
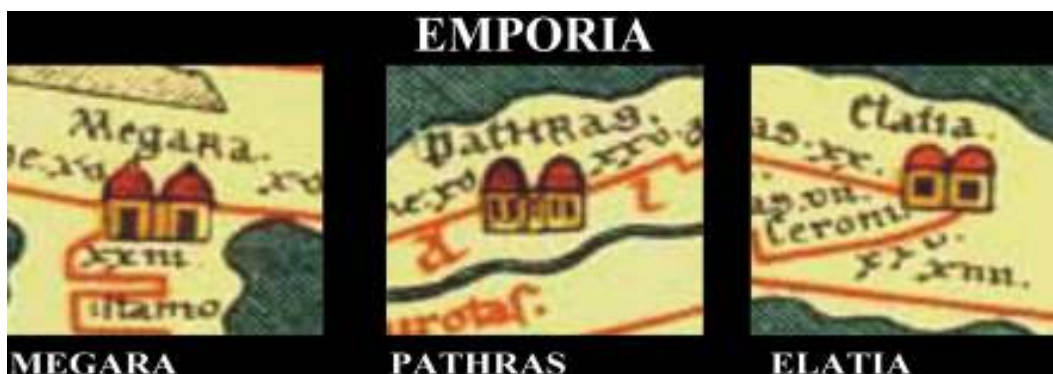
Figure 7. Third level cities.

Figure 8. Commercial centers in the Greek peninsula.

Figure 9. Commercial centers of two different types.

Figure 10. Harbors.

7. The network of settlements is supplemented with the insertion of stations - *mansiones* and points of change of horses - *mutationes* that constitutes the intermediary turning-points between the various central places. They don't have representations, but appear the name and the distance between them.

Urban level

A number of settlements are represented according to particular uses and functions of space that are attributed with the particular characteristics of the shells that support the function. The basic functional uses, which incorporate corresponding social practices and are drawn with their shells are: 1) religious, 2) political, 3) defensive, 4) recreational and 5) remaining uses.

1. There exist in total 33 temples located usually in colonies and points of local adoration, for example in the Balkans (*Ad Dianam)*, in Africa, *(Ad Herculem*, *Temple Jovis*, *Ad Mercurium*, *Temple Veneris)*, while in Egypt can be found 3 temples of Serapis and 3 of Isis. The only Christian reference in the map is the insertion *Ad Scm. Petrum*, close to Rome, a reference to the *Basilica* that was built in the Vatican hill (*Mons Vaticanus*), by Constantine the Great and his mother Helen in the place of *Circus Neronianus*, inaugurated in the 326 A.D. The presence of Jerusalem in the map is of small importance, as the text next to her, that "first was called Jerusalem, but now *Aelia Capitolina* ", makes reference to the emperor Adrian who gave this name to the city. It becomes comprehensible that in the period of map's creation, Christianity, even if present, is not found in the center of interest, in the context of later roman empire.[19] Altars exist in the borders between *Africa* and *Cyrenaica*, as well in the Far East, where two altars with the text " *Hic Alexander responsum accepit: Usque quo Alexander?* ", ("Here Alexander received the question: till where will you reach, Alexander?"), indicating the limits of the then known world. (Fig. 11)

2. Public Buildings, that are categorized in 3 subclasses: i) *Praetorja*, for example in Italy, *Pretorium Laverianum*, in Dalmatia, *Ad Pretorium*, ii) *Horrea publica*, gov-

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[19] Krautheimer 1991: 68-75 and Weber 1999: 41-46

ernment owned barns, for example *Ad Horrea*, in Africa, iii) government owned factories of ceramic production, eg *Adteglanum*, in Italy (Fig. 12).

3. The defensive function is present in all the representations of cities, a fact that is considered in the context of a period after the imperial *pax romana*. Walled settlements constitute the majority of the central places of empire.

4. Recreational functions are represented with thermal Baths, portrayed with square structures, with a closed facade and in the center a swimming-pool. In Italy 15 structures are found, in the Balkans 5, in the Asia Minor and in Syria one each, while in Africa there are 8 such thermal complexes. (Fig. 13).

5. Lighthouses are found in *Alexandria*, Egypt, in *Chrissopolis* (Uskudar) and in *Jovisurius* in the entry of *Euxeinus Pontus*.

Figure 11. Temples, places of worship and altars.

Figure 12. Public buildings (*horrea*).

Figure 13. Thermal facilities.

Concluding remarks

The iconographic system of the *Tabula Peutingeriana* is based upon a hierarchical structure that represents the settlements network, with a process of symbolic generalizations and personifications, in the period of the successors of Constantine the Great. At the top are found 3 first level cities (Rome, Constantinople, Antiocheia) and then follow 6 second level cities (Aquilla, Ravenna, Thessalonica, Nicomedeia, Nicaea, Ancara). Third level cities are numerous and constitute the provincial capitals, followed by groups of settlements with military, commercial, administrative, religious and recreational functions (walled cities, commercial centers, public administrative buildings, temples, thermal installations), while at the bottom of the hierarchy belong the towns (*mansio*) and villages (*mutatio*).

The reliability of map has been placed under contestation by many scholars, in regard to the precision of settlements locations and distances that represent.[20] The administrative organization and the provinces of late empire are not present and one have to seek information in other texts of late antiquity (*Laterculus Veronensis, Notitia Dignitatum* and Hierocles *Synekdimos*) in order to have a picture of bigger administrative divisions. However, at the settlements level, we consider that the map represents symbolically, but with precision, the hierarchy of network, fact that is particularly useful for the study of regional and urban organization of late antiquity. Developing further the information it contains, we think that the *Tabula Peutingeriana*, despite the inaccuracy of the design, despite the fact that it does not obey to any type of projectional system, constitutes an epitome of geographic knowledge of late antiquity, knowledge that is precious for the study of the historical geography of the roman empire.

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[20] Ramsay1962: 62-74.

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