

THE ORIGIN AND DEVELOPMENT OF THE MAIN ROAD INFRASTRUCTURE AND THE CITY NETWORK OF ROMAN DACIA

Abstract: Our intention when we first started to write this paper was simple: to offer the readers the possibility to understand, using as example the province of Dacia, the capacities, the discipline, the genius and the organization of the Romans during and after the conquest of the north-Danubian territories. Dacia represents a very good study case because of several reasons. But one should notice that the difficulty of organizing such province relied on its position: north of the natural frontier, with a very long frontier itself (almost 1500 kilometers) (Fig. 1), with a diverse landscape, composed by plains, hills, mountains, rivers, some of these very difficult to pass. Not only the Roman succeeded to overcome these barriers, as in other cases too, but they planned, constructed and maintained a careful defensive system and an outstanding road network, which had as main element the so-called imperial road, in fact the main 'highway' of Dacia. This is the road which started from the Danube with two branches, Lederata-Tibiscum and Dierna-Tibiscum, continued towards the valley of the Bistra, heading to Ulpia Traiana Sarmizegetusa and then to Apulum, Potaissa, Napoca and Porolissum (Fig. 2). We managed to identify how the Romans planned and used this road. Therefore, we divided the points along this route in two categories: 1. Primary sites, located circa 72 to 80 Roman miles one from another. These points are: Berzovia; II. Ulpia Traiana Sarmizegetusa; III. Apulum; IV. Napoca; V. Porolissum), (Fig. 3); 2. Secondary, intermediate sites, generally positioned in between the points from the first category, at distance of circa 36 to 40 miles. These are: A. Vărădia (Arcidava; B. Jupa (Tibiscum); C. Cigmău; D. Războieni-Cetate (Salinis); E. Sutoru (Optatiana?). We have used a similar method to that of Andrew Burghart for Pannonia to identify these points. The final remarks of our contributions represent a solid prove of the carefulness and accuracy of the Romans during the process of conquest and organisation of Dacia.

Keywords: roads, cities, Roman Dacia, organization, primary sites, secondary sites.

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1. PREMISES. ROADS AND CITIES.

DEVELOPMENT STRATEGIES IN THE ROMAN EMPIRE

Almost 40 years ago, in 1979, Andrew Burghardt published a valuable contribution about the origin of the roads and city network of Roman Pannonia.¹ It starts from the observation that 'the pattern of the network was determined by the selection of basic strategic objectives,

¹ BURGHARDT 1979, 1-20; FODOREAN 2016, 46-47.

which were placed on specific sites of high military-transport potentiality'.² Analyzing the network genesis from Pannonia in close relation with the route network, the author was able to define an 'impulse chain' pattern, including six stages: 1. The so-called impulse generator, or, in other words, the decision-making centre. For Pannonia, the author considered Rome to be this centre, envisaged as the initiator of the decision to conquer new territories, to set up new roads and to create new cities. 2. To move forward, the author defined a link between the generator and the primary objective. This is the so-called base of operation. 3. In the third stage, Burghardt took into consideration the point from which the movement begins. This was perceived as the launching point. 4. The fourth strategic point was defined as the major crossroads of the province. 5. The fifth strategic point was considered the central crossroads; 6. The final point was identified as the primary or strategic objective, or the area towards which the roads are directed, normally located on the periphery of each province.

As far as Pannonia was concerned, the cities chosen as examples for each category are: 1. Rome, the administrative centre of the Roman Empire. 2. Aquileia, as the closest city to Pannonia. 3. Emona (modern-day Ljubljana) was chosen as the launching point. 4. The gateway was Poetovio (Ptuj). This was the place where in 69 A.D. Vespasian was elected Roman emperor by the Danubian legions; it was also the base-camp of *legio XIII Gemina*. Under Trajan, in 103 A.D., the settlement became *Colonia Ulpia Traiana Poetovio*. In the Antonine itinerary, the main roads of the province start from Poetovio. 5. The central communication node was Savaria. 6. The strategic objectives were Carnuntum (at the beginning of Roman occupation), then Aquincum. The third city, according to its strategic importance, was Brigetio.³ The fourth city in significance for the Romans was Vindobona. According to the author, in addition to these cities, other important centers developed over time, such as Arrabona or Scarabantia.

Our study will try to reveal if such model can be also applied for Dacia. We will take into consideration not only the presentation of the main arteries of the province, but also the interconnectivity between these primary strategic roads, and the origins and the development of new cities along these roads.

2. THE CONQUEST OF DACIA AND THE ORIGIN OF THE ROUTE NETWORK

Before the conquest of Dacia, Trajan had carefully prepared the invasion of the north-danubian territories, by accomplishing several things. The most important were, according to our opinion, the improvement of the road infrastructure from Pannonia and Moesia, in order to reach the areas close to the Dacian lands easily, and the inclusion, within his staff, of important specialists in logistics and land measurement (the *ensor* Balbus, the architect Apollodorus), who were capable of organizing the new conquered territory.⁴

On the right bank of the Danube, the construction of the road started during the reign of Tiberius.⁵ This artery was

planned and built by two important legions: *IV Scythica* and *V Macedonica*, as proved by two inscriptions (one discovered in Gospodjin Vir and the other one in Boljetin) dated 33/34 A.D.⁶ The construction of this artery was finished during Trajan's reign. The rock-carved inscription from Ogradena records the operations performed by the Romans to finish this road in 100 A.D.⁷ Also, the navigating conditions across the Danube Klisura were improved.⁸

During this first campaign (101-102 A.D.) the Roman military units penetrated into the territory of the Banat using two roads, which rapidly became parts of the main artery of Dacia. The first was the road between Lederata (today Ram in Serbia) and Tibiscum (today Jupa in Caraș-Severin County). The second one was the road between Dierna (today Orșova in Mehedinți County) and the same Tibiscum. Besides the Trajan's Column, where we find scenes depicting soldiers involved in the road building somewhere in Banat,⁹ the only available source for the reconstruction of the events happened during these wars is Trajan's work, *De Bello Dacico*. But only one sentence has survived: *inde Berzobim, deinde Aizi processimus* ('from there we advanced to Berzobis, and then to Aizis'). These two settlements are also recorded in the Peutinger map along the road Lederata-Tibiscum (the western road). Trajan's sentence describes the advancement of the Roman army on this road built during the first military campaign in the western part of Banat.¹⁰ Most probably the emperor used the same simple style to present the settlements located along the advancement lines, and maybe also the distances between them, in the form of a written *itinerarium*. This knowledge could be easily transformed into an *itinerarium pictum*. Both these types of data were considered, even in the fourth century A.D., the most important sources of strategic and geographic knowledge, as it is suggested by Flavius Vegetius Renatus (ca. 400 A.D.), who recommended the use of depicted and written itineraries in his work *De re militari*: 'A commander must have *itineraria* written out, so that he might learn not only the usual information on distances but also about the condition of the road, and also so that, having had them accurately described, he might take into account shortcuts, branch-roads, hills, and rivers. So much so, that more ingenious commanders are claimed to have had itineraries of the areas in which their attention was required not so much annotated but even illustrated, so that the road for setting out on might be chosen not only by a mental consideration but truly at a glance of the eyes'.¹¹

26-27; FODOREAN 2016, 27-28.

⁶ *Ti. Caesare Aug[usti] F[ilii] / Augusto Imperato[re] / Pont[ifice] Max[imo] Tr[ibunicia] Pot[estate] XXXV / Leg[io] III Scyt[hica] Leg[io] Maced[onica]*; BOŠKOVIĆ 1978, 425-463.

⁷ CIL 3, 1699; ROSSI 1968, 41-46; BECATTI 1982, 566; PETROVIĆ 1986, 41; FODOREAN 2016, 28.

⁸ AE 1973, 475 (inscription dated 101 A.D. discovered at Karataš, mentioning the efforts for the rehabilitation of the Danube course: *ob periculum cataractarum derivato flumine tutam Danuvi navigationem fecit*). Also ŠAŠEL 1973, 80-85; TIMOC 2001, 97-116; NEMETH 2007, 148; FODOREAN 2016, 28.

⁹ These scenes are impossible to locate with accuracy in the terrain, as ANTONESCU 1910 attempted and failed. See also: MICLEA, FLORESCU 1980; VULPE 1988; COULSTON 2001, 106-137.

¹⁰ BĂRBULESCU 1999, 34.

¹¹ Text and translation after SALWAY 2001, 31.

² BURGHARDT 1979, 1.

³ FODOREAN 2016, 46.

⁴ FODOREAN 2016, 27.

⁵ GABRIČEVIĆ 1972, 408-416; MIRKOVIĆ 1996, 27-40; MIRKOVIĆ 2007,

How accurate was planned the north-danubian conquest and the organization of the new territory? One answer is to be found in Balbus' book on topography and geometry, entitled *Expositio et ratio omnium formarum*, dedicated to Celsus, the famous mathematician from Alexandria in Egypt. The information which survived is essential for understanding the role played by surveyors during the expeditions against the Dacians: 'After we entered enemy territory for the first time, Celsus, the operations of our emperor immediately began to require surveying skill. Two aligned straight lines (rigores) had to be established, with a defined width for the roadway between them ... Through your invention the use of the ferramentum revealed these (lines), when part of the work had been brought into the line of sight. In respect of the survey of bridges, we were able to work out from the adjacent bank the width of rivers, even if the enemy wished to launch repeated attacks. Furthermore, that skill venerated by the gods showed us how to work out the height of mountains that had to be stormed. After it had been tested in the great events in which I had participated, I began to cultivate this skill more devoutly, as if it were worshipped in all the temples, and hastened to complete this book as if I were fulfilling a vow.'¹²

Using land measurements, and geometric methods, with the help of the *mensores* from legions,¹³ Balbus established the path of the roads and the location of the future forts. During the military campaigns, he coordinated the building of the roads necessary for the troops to advance and the forts to accommodate the soldiers of the legions and the auxiliary troops. At the end of the first military campaign the region of the Banat came under Roman control. The forts from Vărădia, Surducu Mare, Berzovia, Fârliug and Cornuțel were built along the western road. The forts from Dierna (today Orșova, Mehedinți County), Mehadia and Teregoa were erected along the eastern branch (**Fig. 1**). From Tibiscum, the most important crossroads in Banat, the main artery headed along the valley of the River Bistra, through the Iron Gates of Transylvania, towards Ulpia Traiana Sarmizegetusa. At Zăvoi, between Tibiscum and Ulpia, a fortress was also erected.¹⁴ Leaving aside the period from 103 to 105 A.D., when Apollodorus surveyed the construction of the longest bridge in the Roman Empire, between Drobeta (Drobeta-Turnu Severin, Romania) and Pontes (Kladovo, Serbia),¹⁵ another key aspect in this discussion is the Balbus' presence in Dacia for a year, after the conquest of the province in 106 A.D., to organize the new conquered territory, together with the governor of the province.

After 106 A.D., the *legio XIII Gemina* at Apulum (today Alba Iulia, Alba County) and the *legio IIII Flavia Felix* at

Berzobis (today Berzovia in Banat) were garrisoned in Dacia. It is important to emphasize that both were strategically placed on Dacia's main Roman road, exactly 72 Roman miles south and north of the Dacia's main city, Ulpia Traiana Sarmizegetusa. This proves that accurate measurements along roads were made from the beginning of the Roman presence north of the Danube.¹⁶ These data were grouped into written or painted *itineraria*, first used by the army.

Therefore, Dacia was finally conquered and it became a Roman province. Quite rapidly, as we will see below, the Romans succeeded to finish the construction of the the main artery of the province, its so-called 'highway'. Starting from the Danube, this road crossed the region of Banat with its two branches (Lederata-Tibiscum and Dierna-Tibiscum), heading towards Ulpia Traiana Sarmizegetusa and then to Apulum, Potaissa and Napoca, ending in the northernmost point of Dacia, Porolissum.¹⁷ The total length of this road is of circa 450 km. The next step, happened in the next decades, was to choose the location and to build the future cities. All the major cities of Dacia (Dierna, Tibiscum, Ulpia Traiana Sarmizegetusa, Apulum, Potaissa, Napoca and Porolissum) are located along this road. Also, the legions which defended the province were garrisoned along this artery. The crossroads of Dacia was Apulum. The major part of the *villae rusticae* is located along the same road, close to these major cities. The same artery was depicted in the Peutinger map.

3. THE MAIN ARTERY OF DACIA REFLECTED IN THE EPIGRAPHIC SOURCES AND IN THE PEUTINGER MAP

How rapidly did the Romans erect the main road in Dacia? The answer is to be found in the text of the inscription of the milestone discovered in 1758 at Aiton (Cluj County), today lost.¹⁸ This small village is positioned between Potaissa (Turda) and Napoca, exactly 10 miles (14.785 km) north of Potaissa. Recent research has shown that during Roman times, a *mansio* was established on the territory corresponding to the current village, precisely in its northern part, very close to the main road.¹⁹ A rural settlement also developed here, documented by the discovery, in many places, of wall substructions, coins, and ceramic fragments.²⁰ The milestone is outstandingly important for the history of Dacia. It demonstrates how fast the Romans fulfilled their task of organizing the road network into the new conquered territory. Also, the final formula from the inscription, *a Potaissa Napocae*, represents the first epigraphic evidence of Potaissa and Napoca. Another essential aspect is the mentioning of *cohors I Flavia Ulpia Hispanorum milliaria civium Romanorum equitata* as the military unit which built this military road or at least the sector located between the two settlements recorded above. The troop participated

¹² Text and translation after CRIȘAN/TIMOC 2004-2005, 157-170; also ROBY 2014, 34-35.

¹³ A discussion about their contribution to the organization of the new province and their topographic skills in FODOREAN 2016, 32-33. Also BAATZ 1984, 315-325 (for *mensores* recorded in auxiliary units); SHERK 1974, 546-551; for more general aspects NICOLET 1991, 151-157; MARCU 2009, 23.

¹⁴ NEMETH/FODOREAN/MATEI/BLAGA 2011, 56, and figs 18, 120, 19, 121, figs 41, 142.

¹⁵ O'CONNOR 1993, 142-145 (no. T13); GALLIAZZO 1994, 320-324 (no. 646); VUČKOVIĆ, MIHAJLOVIĆ, KAROVIĆ 2007, 119-130.

¹⁶ Contra, but without any clear arguments, WHITTAKER 2004, 34.

¹⁷ FODOREAN 2012, 255-279.

¹⁸ CIL III, 1627: *Imp(erator) / Caesar Nerva / Traianus Aug(ustus) / Germ(anicus) Dacicus / pontif(ex) maxim(us) / [tribunica] pot(estate) XII co(n)s(ul) V (sic) / imp(erator) VI p(ater) p(atriciae) fecit/ per coh(ortem) I Fl(aviam) Ulp(iam) / Hisp(anorum) mil(liariam) c(ivium) R(omanorum) eq(uitatam) / a Potaissa Napocae / m(illia) p(assuum) X*; WINKLER, BLĂJAN, CERGHİ 1980, 63-73; WINKLER 1982, 587-589; FODOREAN 2016, 89-90.

¹⁹ FODOREAN 2015, 217-232.

²⁰ BLĂJAN/CERGHİ 1978, 21-27; FODOREAN 2006, 133.

in the wars against the Dacians and after 106 A.D. it was garrisoned at Orheiu Bistriței (Bistrița-Năsăud County), along the north-eastern frontier.²¹

How the new roads, settlements and distances were recorded? Obviously, the Peutinger map is the only document which enables us to affirm that right from the beginning of the first war, continuing with the second campaign, and immediately after the conquest, this new road network was registered with great accuracy in military itineraries. Such documents were used afterwards to compile, during the fifth century A.D., the so-called *Tabula Peutingeriana*.²²

The segments VI and VII include data about three roads in Dacia: Lederata-Tibiscum, Dierna – Tibiscum – Sarmizegetusa – Apulum – Napoca – Porolissum and Drobeta – Romula – Caput Stenarum – Apulum.²³ The settlements *Tivisco*, *Sarmategte*, *Apula*, *Napoca* and *Porolisso* are indicated by double-tower vignettes. A special vignette, indicating a thermal place, is represented at Ad Aquas.

All these three roads were of great importance. The main one is the so-called imperial road, from the Danube to Porolissum. The second is a sector connecting Drobeta with the valley of the River Olt. The third road is a strategic sector built along the valley of the River Olt, from Romula to Apulum. For our discussion, we are interested in the first road. Along it, the following distances and settlements are indicated: 1. *Segmentum VI* 2: the road between Lederata and Tibiscum: Lederata-XII (Roman miles); Apus flumen-XII; Arcidava-XII; Centum Putea-XII; Berzobis-XII; Aizis-III; Caput Bubali-X; Tivisco (depicted by a vignette). Eight settlements are mentioned as well as a total distance of 73 Roman miles; 2. *Segmenta VI* 3 and *VII* 1: the road between Tierva and Porolisso: Tierva-XI (Roman miles); Ad Mediam-XIII; Pretorio-IX; Ad Pannonios-IX; Gaganis-XI; Masclianis-XIII; Tivisco-XIII; Agnavie-VIII; Ponte Augusti-XV; Sarmategte-XIII; Ad Aquas-XIII; Petris-VIII; Germizera-VIII; Blandiana-VIII; Apula-XII; Brucla-XII; Salinis-XII; Potavissa-XXIII; Napoca-XVI; Optatiana-X; Largiana-XVII; Cersie-III; Porolisso. Twenty-four settlements are indicated as well as a total distance of 270 Roman miles.

4. MENSORES AT WORK: MILITARY STRATEGIES AND GEOGRAPHICAL KNOWLEDGE. FORTS, CITIES, AND DISTANCES ALONG THE ROAD LEDERATA/DIERNA – TIBISCUM – POROLISSUM

Recently we have concluded that the military roads indicated on the Peutinger map represent the lines of advance taken by the Roman marching columns during the Dacian wars.²⁴ The forts and stations built right after the conquest replaced the provisory ones built by the army during the military campaigns. All the specialists involved in the organization of the new province relied on

the capability of the legions to build roads and fortresses, coordinated by *mensores* and using terrain reconnaissance mainly performed by *exploratores*. During the conquest of the Dacian territories, the Romans applied an extraordinary military strategy. This is noticeable when we analyze the distances between the stopping points, which in many cases is 12 miles (sometimes 13, 11 or 9).²⁵ Such value is smaller comparing with the indications from ancient sources, which record an average distance to be covered in one day of 20 Roman miles, but this did not apply to times of military campaigns,²⁶ only during training.

Therefore, how was Dacia 'measured' and organized?

4.1. The decision making center

Obviously, as in the case of Pannonia, this was Rome, and also the desire of several Roman emperors to conquest the regions north of the Danube. During Augustus' reign, this was only an idea. Domitian actually tried to gain control over the north-Danubian territories, but he failed.²⁷ Trajan succeeded to conquer Dacia. The humiliation of Domitian's military campaigns was erased.

4.2. The base of operation

In our case, this was Singidunum. Marked on the Peutinger map with the usual double-tower vignette, the settlement was also attested by this toponym in Ptolemy's *Geographia*. The topography of the site includes a legionary fortress, the *municipium* and *colonia Singidunum*, the necropoleis and the territory belonging to the settlement (*ager Singidonensis*).²⁸ The legionary fortress today completely overlaps with the medieval and Austrian fortification of Belgrade, on the grand plateau called 'Kalemegdan'.²⁹ In 86 A.D. the *legio IIII Flavia Felix* arrived there. Its presence determined a rapid development of the settlement. The fort was erected exactly at the point where the Sava flows into the Danube.³⁰ Research was carried out there after the Second World War, in 1953, 1960, 1963–1964, 1968, and 1971–1973.³¹

4.3. Stopping point, crossroads, forts and cities along the main road of Dacia

We have often highlighted that the Roman road Lederata/Dierna – Tibiscum – Porolissum was the most important artery in Roman Dacia.³² Of 11 *municipia* or *coloniae* attested in Roman Dacia, the following seven are located along the main artery of the province (from south to north) (**Fig. 2**): Tibiscum, Ulpia Traiana Sarmizegetusa, Apulum I and Apulum II, Potaissa, Napoca and Porolissum.³³ In Dacia three legions were garrisoned: 1. In Apulum, legio

²¹ PROTASE 2008.

²² The entire discussion about the role, purposes, the dating of the Peutinger map, and the roads depicted in Dacia, together with a detailed presentation of the history of research and bibliography in FODOREAN 2016, 41–43 and 83–100 (chapter 6: *Dacia in the Ancient Geographical Sources*).

²³ I did not illustrate in this study the section from *Tabula* covering the territory of Dacia. The entire itinerary, including the complete alphabetical list of all the settlements in the Peutinger map, can be easily consulted in R. Talbert's database, online, at: <http://cambridge.org/us/talbert/index.html>.

²⁴ FODOREAN 2016, 95.

²⁵ DIACONESCU 1997, 13–52.

²⁶ Vegetius, 1.9–10; translation in CAMBELL 2004, 48, 51–52; MILNER 1993, 10; BENNETT 1997, 92.

²⁷ FODOREAN 2016, 23.

²⁸ BOJOVIĆ 1996, 53.

²⁹ BENEÁ 1983, 159.

³⁰ FODOREAN 2016, 101.

³¹ GUDEA 2001, 50, with all the bibliography.

³² FODOREAN 2016, 84–91.

³³ Dierna and Drobeta are located along the Danube River, Romula along the valley of Olt and Ampelum along the valley of the river Ampoi, west of the main imperial road, close to the core of the Apuseni Mountains, where Alburnus Maior is located.

XIII Gemina, from 106 to 271 A.D.; 2. In Berzovia, legio IIII Flavia Felix, from 106 to 117 A.D.; 3. In Potaissa, legio V Macedonica, from 168 to 271 A.D. All these three fortresses are located along the same main artery of Roman Dacia.

What is important for our discussion? Along the main imperial road Lederata/Dierna-Tibiscum-Porolissum, we think that the Romans established with accuracy several strategic points, according to primary measurements executed during the military campaigns and immediately after the conquest of Dacia.

We divided these points in two main categories:

1. Primary sites, strategically outstandingly important, positioned circa 72 to 80 Roman miles one from another. These points are: I. Berzovia – fortress of *legio IIII Flavia Felix*, garrisoned here from 106 to 117 A.D.; II. Ulpia Traiana Sarmizegetusa – legionary fortress in the first phase, from 102 to 106 A.D.; III. Apulum – fortress of *legio XIII Gemina*, garrisoned here from 106 to 271 A.D.; IV. Napoca – *municipium* during Hadrian's reign; V. Porolissum (today Moigrad, Sălaj County), the northernmost site of Dacia, located on the frontier, where several troops were garrisoned in a large auxiliary fort positioned on the Pomet Hill (**Fig. 3**);

2. Secondary, intermediate sites, generally positioned in between the points from the first category, at distance of circa 36 to 40 miles (half of the distances in between the first category of points). In our opinion, these are: A. Vărădia (Arcidava?), where two auxiliary forts were identified; B. Jupa (Tibiscum), an important crossroads, where the two branches of the imperial road intersect. An important fort is attested here; C. Cigmău (close to Germisara, Hunedoara County), where an auxiliary fort was erected; D. Războieni-Cetate (Salinis); E. Sutoru (Optatiana?)

In the following, we will describe and analyze this pattern.

4.4. Primary sites

4.4.1. Berzovia

It was the garrison of legio IIII Flavia Felix, which was brought in Dacia from Singidunum in Moesia Superior to fight against the Dacians together with Trajan. There is a strong possibility that this legion remained after the first war north of the Danube, on the spot where the future *Colonia Ulpia Traiana Sarmizegetusa* was built. After the end of the second Trajanic war in 106 A.D., the legion built a fortress in Berzobis (today Berzovia, Caraș-Severin County), of 490 x 410 m, with a precinct made of earth and a wooden palisade.³⁴ Although researches have been made here with several occasions,³⁵ the inner topography of the fortress is still, in some parts, unknown, except the location of the *principia* and other elements of its defensive system. At the beginning of Hadrian's rule, the legion was sent back in Moesia Superior.

³⁴ OPREANU 2006, 68, believes that legio IIII FLAVIA Felix was garrisoned in Berzobis from 101 A.D. (the beginning of the first Trajanic war) until 117 A.D. (end of Trajan's reign), in a fortress with a wooden *principia*, rebuild in stone.

³⁵ Some results of these researches: PROTASE 1967, 47-72; MOGA 1971, 51-58; MEDELEȚ, PETROVSCHI 1974, 134-136; MEDELEȚ, FLUTUR 2002, 95-100; FLUTUR 2011, 145-160; NEMETH 2016, 221-240; ZAHARIADE 2011, 101-124; RANCU 2014, 57-66.

Beside lack of data regarding the internal topography of the fortress, the most important aspect for our study is the analysis of the location of this important strategic objective. Berzobis is located along the first road depicted in the Peutinger map, the road between Lederata and Tibiscum (*segmentum* VI 2): Lederata-XII (Roman miles); Apus flumen-XII; Arcidava-XII; Centum Putea-XII; Berzobis-XII; Aizis-III; Caput Bubali-X; Tivisco (depicted by a vignette).

Therefore, from Lederata (Ram, Serbia) to Tibiscum (Jupa, Caraș-Severin County, Romania), the Peutinger map marks seven settlements and six distance figures. This road was traced, constructed and used by the Roman armies led by Trajan in the first military campaign (101 A.D.). It was the road followed by Trajan, as he states in his *De Bello Dacico*: *Inde Berzobim, deinde Aizi processimus* ('From there we advanced to Berzobis, and then to Aizis'). Along this road, five distance figures out of seven have the value of 12 miles, one of three miles and one of ten miles. The total distance (73 miles – almost 108 km) is correct if the locations proposed are correct as well. So far, we know little about the location of these intermediate points. *Apus flumen* was identified with the river Caraș. The next stations were hypothetically located as follows: Arcidava (Vărădia?); Centum Putea (Surducu Mare?); Berzobis (Berzovia); Aizis (Fârlug?); Caput Bubali (Cornuțel?); Tivisco (Jupa). There is, however, one mistake. Between *Aizis* and *Caput Bubali* only III miles are depicted on the Peutinger map. If there were not only III, but XIII miles, the stretch would fit the current distance between Fârlug and Cornuțel. Such a mistake could have occurred when the medieval copyist transposed the information from the original. In that case, this segment renders a total distance of 83 miles, which equals 122.7 kilometers.

4.4.2. Ulpia Traiana Sarmizegetusa

Founded immediately after the conquest of Dacia, but not earlier of 108/109 A.D.,³⁶ *Colonia Traiana Augusta Ulpia Dacica Sarmizegetusa* was the first *colonia deducta* of Roman Dacia. The city with an estimated population of 20,000 inhabitants was the headquarters of the financial procurator of Roman Dacia and also benefited of *ius Italicum*. It was the administrative, financial, political and cultural metropolis of Dacia. In fact, it received the epithet *metropolis* during the reign of Severus Alexander. It had a total surface of 32.4 ha (600 x 540 m) *intra muros*. Archaeologically, several important buildings were discovered in Ulpia: the *forum*, the *praetorium* of the financial procurator, an amphitheatre, a *schola gladiatorum*, and several temples. The first *Capitolium* of the province was erected here.³⁷ But again, for our discussion, the most important aspect is the fact that the city is located circa 72 Roman miles from Berzovia and 72 miles away from Apulum. Therefore, the most important settlement of Dacia was located half-way between the two legionary fortresses erected in Dacia during Trajan. G. Cupcea has already commented upon the strategic reasons which determined the Roman to position their colonies close to the legionary fortresses by the time of Trajan.³⁸

³⁶ See a detailed presentation of the debate around this aspect in OPREANU 2016, 205-226.

³⁷ PISO 2010, 269-278.

³⁸ CUPCEA 2011, 250.

4. 4. 3. Apulum

Apulum was the most important crossroads in Dacia. Several roads converged in the city: 1. the road connecting Dacia with Pannonia along the river Mureş towards Partiscum (today's Szeged, Hungary); 2. the roads along the valleys of Târnava Mare and Târnava Mică; 3. the road leading to the gold district, in the Apuseni Mountains, at Alburnus Maior (Roşia Montană). The Peutinger map shows the main road at Apulum as well as the road which connects Drobeta, via Romula, to Apulum, along the valley of the river Olt. The settlement is represented by a vignette. Apulum was the headquarters of the *legio XIII Gemina* from 106 to 271, when the province was abandoned. The city flourished during Marcus Aurelius' rule, when the initial pre-urban nucleus (in the southern part of the current city) became a *municipium*. Under Commodus the settlement turned into *colonia Aurelia*. At the beginning of the third century A.D. the colonia received *ius Italicum*. The rest of the city developed close to the fortress, on Cetate Hill, and under Septimius Severus it became *municipium Septimius Apulense* and then *colonia* under Traianus Decius.

These two cities, together with the military fortress, formed the biggest and the most important settlement in Roman Dacia. With an estimated population of ca. 35,000, Apulum was also the headquarters of the consular governor of Dacia. Commercial traffic developed along the river Mureş, and a harbour was constructed to handle all the settlement's activities. The fortress of *legio XIII Gemina* (440 × 430 m) now overlaps with the medieval and modern Vauban citadels. One aspect should be mentioned: The *porta principalis dextra* is very well preserved to this day. Stamps reading *LEG XIII GEM* were found everywhere in a vast area, up to the gold district in the north-west. This underlines the strategic importance of this legion positioned along the main imperial road, capable of acting in different areas, especially in the west and north, to safeguard the gold mines.

4. 4. 4. Napoca

Napoca is represented on the Peutinger map by a double-tower vignette. The city flourished during Hadrian's reign, when it became *municipium Aelium Hadrianum Napocensium*.³⁹ Napoca was surrounded by a wall of the *opus quadratum* type, which enclosed a total area of circa 25 ha.⁴⁰ With an average population of 15,000 inhabitants, Napoca became *colonia Aurelia* during the reign of Marcus Aurelius. Septimius Severus rewarded the city with the *ius Italicum*. The Roman city was later almost totally covered by the medieval settlement. Because of the *ius Italicum*, numerous landowners positioned their farms in close proximity to the city. Napoca was also an important crossroads. It was the starting point of a westwards route leading to the military fort in Gilău and forward towards west to the military fort in Bologa. Another branch starting from Napoca continued along the valley of Someşul Mic, following the right bank of the river, until it reached the fort from Gherla and then the valley of the Someş river. The imperial road coming from Potaissa exited from Napoca heading towards north-west, to Porolissum, via Mera, Şardu and Sutoru. Because this city is located along the main road of Dacia, and of course

because of the intensive process of colonization in Dacia which started during Trajan's reign, Napoca, like other cities, rapidly flourished.

4. 4. 5. Porolissum

It took only around 8 to ten years for the Romans to built the most impressive road north of the Danube, starting right with the first military campaign in 101-102 A.D. The milestone from Aiton, dated in 108 A.D., represents a strong argument to affirm that the imperial road was built rapidly and maybe in 110 A.D. or around this year the road reach the northernmost point in Dacia, Porolissum. A beautiful layer of volcanic stones covers the surface of the road right at the entrance in the roman city.

Porolissum was defined by the Romanian historiography, many times, as the key of the defensive system of northern Dacia.⁴¹ So it is. The sophisticated defensive system created here included two Roman forts, watchtowers, and walls of defense. A large civilian settlement developed here. The Roman road is very well preserved at the entrance to the city.

Porolissum became a *municipium* during the reign of Septimius Severus.⁴² Beside the two forts,⁴³ the archaeological excavations unearthed a *statio portorii*,⁴⁴ temples (among them, one dedicated to Iupiter Optimus Maximus Dolichenus),⁴⁵ an aerial aqueduct (the only one of this kind found so far in Dacia),⁴⁶ an *amphiteatrum castrense*⁴⁷ built of wood in the early period of the province and rebuilt in stone in the time of Antoninus Pius. A large bi-ritual cemetery has also been identified.

Several important military units are attested in Porolissum. Among these, we mention *cohors V Lingonum*, *cohors I Brittonum milliaria*, *cohors I Augusta Ituraeorum*, *cohors I Hispanorum quingenaria*, *cohors III Campestris*, *numerus Palmyrenorum Porolissensium sagittariorum*, together with *vexillationes* from legions XIII Gemina, VII Claudia, VII Gemina and III Gallica. The city was estimated to have housed 20,000 inhabitants.⁴⁸

4. 5. Secondary sites

As we have already mentioned, these intermediate or secondary sites are key-strategic points located at distances of circa 36 to 40 miles away from the primary sites, or half distance between these main sites. All the secondary sites considered by us in our demonstration are actually represented by military forts: A. Vărădia (Arcidava?); B. Jupa (Tibiscum); C. Cigmău (close to Germisara, Hunedoara County); D. Războieni-Cetate (Salinis); E. Sutoru (Optatiana?).

We shall briefly describe these sites.

⁴¹ E.g. GUDEA 1989.

⁴² ARDEVAN 1988, 67.

⁴³ Several new researches regarding the city and mainly the fort located on the Pomet Hill: ŞTEFAN/OPREANU/LĂZĂRESCU 2013, 509-524; OPREANU/LĂZĂRESCU/ŞTEFAN 2013, 83-106; OPREANU/LĂZĂRESCU 2015, 901-907.

⁴⁴ GUDEA 1988, 175-189; GUDEA 1996.

⁴⁵ GUDEA/TAMBA 2001.

⁴⁶ MATEI 2005, 293-311.

⁴⁷ BAJUSZ 2011.

⁴⁸ FODOREAN 2016, 91.

³⁹ ARDEVAN 1998, 147-148.

⁴⁰ RUSU-BOLINDEŢ 2007, 87.

4. 5. 1. Vărădia (Arcidava?)

The site, where two fort were erected, is located in the Banat region, along the western road starting from Lederata towards Tibiscum. On the hill „Chilii”, the Romans first built an earth and timber fort of 214 x 132 m. The historians generally accepted the idea that the fort was used only during the Dacian wars, based on two important facts. One is represented by the discovery of a tile with the stamp of the legio IIII Flavia Felix.⁴⁹ A detachment from this legion was garrisoned in this fort during the military operations from the Dacian wars. The other argument which supports the idea of a short existence of the fort from “Chilii” is another archaeological reality: the Romans built another fort, only at circa 900 m to the south of the first one, in a place named today “Pusta Rovinei”. This second fort of 170 x 154 m⁵⁰ garrisoned an infantry unit, the cohors I Vindelicorum milliaria equitata. Excavations carried out here revealed the existence of the building phases, first with the internal buildings of earth and timber and then rebuilt in stone.⁵¹

4. 5. 2. Tibiscum (Jupa)

The location of *Tibiscum* in Dacia is exceptional. It proves, once again, the genius of the *mentores* in Roman army. It is situated 36 Roman miles East of Berzovia, exactly half of the distance from Berzovia to Ulpia Traiana Sarmizegetusa, which is, along the Roman road, 72 miles. More, the ancient settlement has a privileged position, along the valley of the Timiș River, within a depression limited by the Poiana Ruscă Mountains, the Godeanu Mountains and the massive of Semenici. This location is ideal. That is why the Romans used it as a outpost during the military campaigns against the Dacians. The soldiers following the road from Lederata (headed by Trajan's himself) met the other troops coming from Dierna in Tibiscum, before the penetration into the Dacian territory along the Bistra river. Therefore, *Tibiscum* is more than a secondary site. It is, in our context. But on a general map of Dacia, its location is extremely related to its importance. The presence of five forts⁵² in this place represents not only an interesting case, but also proves the importance of the site. Although these camps were obviously not contemporary, a fort of 110 x 101 m is documented during Trajan's period.

But not the fort is important. The city which developed here is also an element important for our discussion. A *pagus Tibisciensis*⁵³ at the beginning, located within the territory of Ulpia Traiana Sarmizegetusa, it will become during the third century A.D. *municipium Tibiscense*.⁵⁴ Although the first epigraphical attestation is dated during Gallienus,⁵⁵ such a late promotion to the status of *municipium* is unlikely. Historians have agreed on an earlier date for this, during the reign of Septimius Severus.⁵⁶ On the left bank of the Timiș River, close to the military fort, a *vicus militaris* is attested.⁵⁷

⁴⁹ NEMETH 2014, 34, with bibliography.

⁵⁰ MARCU 2009, 172.

⁵¹ NEMETH 2005, 139-131; NEMETH 2014, 34.

⁵² MARCU 2009, 160.

⁵³ MOGA 1970, 41-50; BENEĂ/REGEP 2016, 323-324.

⁵⁴ ARDEVAN 1988, 41-42.

⁵⁵ ARDEVAN 1988, 41.

⁵⁶ ARDEVAN 1988, 41-42.

⁵⁷ ARDEȚ/ARDEȚ 2004.

The archaeological excavations have revealed some important elements of the vicus, including the internal road system⁵⁸ and a thermal complex. The cemetery of the settlement is located along the Roman road which heads toward Dierna,⁵⁹ in the southern part of the vicus.

4. 5. 3. Cigmău (Hunedoara County)

The fort from Cigmău is located at a distance of circa 40 Roman miles (around 60 kilometres) north-east of Ulpia Traiana Sarmizegetusa. This distance was measured following, obviously, the line of the Roman road, identified in the terrain in several points along this area.⁶⁰ Speaking of roads, we should mention that the fort was connected with the thermal complex in Germisara (today Geoagiu Băi, Hunedoara County) with a segment of road also identified in the terrain and carefully mapped,⁶¹ which is actually one of the best preserved road sectors in the entire Roman Dacia. The point where the fort is located is entitled “Cetatea Urișilor” (translated is “The giants fort”). The position chosen by the Romans to build this fort is another example of their awareness regarding the potential of the terrain in the organization of the landscape. It is a nice plateau very close to the Mureș River. The hill dominates the landscape and from the fort the horizon opens nicely towards south, west and east. As we already noticed, the distance from Ulpia Traiana until here is of circa 40 miles. Another aspect is also important. The distance from Micia (today Vețel, Hunedoara County) until Cigmău is of circa 25 Roman miles along the Roman road.⁶² Actually, the fort is located half distance away both from Micia and Apulum. The troop attested in the fort of Cigmău is *pedites Britannici*.⁶³

The fort itself represents the proof of the capacity of Roman engineers to adapt the construction to the terrain features. They built it in a shape of an irregular trapeze, trying to set the enclosure walls using the shape of the terrain. Archaeological excavations were carried out here in 2000 and 2002. Aerial photographs have also revealed the existence of a *vicus militaris* close to the fort.⁶⁴

4. 5. 4. Războieni-Cetate (Alba County)

The same topographic pattern is attested also in Războieni-Cetate like in Cigmău. A Roman fort, the garrison of *ala I Batavorum milliaria*, and its *vicus militaris*, are both identified.⁶⁵ Archaeological excavations were carried out in the fort.⁶⁶ The *vicus* was identified based on aerial photographs. The site is located 36 Roman miles north-east of Apulum, along the former Roman road. What is more interesting is the fact that the same site from Războieni is located at the same distance of 36 miles away from Napoca. In a word, between Apulum and Napoca there are 72 Roman miles, and the fort of Războieni is located at the half of the distance. This fact is very important for the configuration of

⁵⁸ BENEĂ/CÎNTAR 2015, 125-131.

⁵⁹ BENEĂ/REGEP 2016, 330-331.

⁶⁰ See for this road FODOREAN 2007, 365-384.

⁶¹ FODOREAN 2001, 203-220.

⁶² MARCU 2009, 122.

⁶³ MARCU 2009, 127.

⁶⁴ HANSON/OLTEAN 2003, 103-109; OLTEAN 2007, 158.

⁶⁵ Details in POPOVICI/VARGA 2010.

⁶⁶ See RUSU-BOLINDEȚ/ONOFREI 2010, 396-442.

the imperial road in Dacia and its elements. One example will support more our affirmation. During Gallienus, when detachments from the legio V Macedonica were sent away from Potaissa to fight outside Dacia, *ala I Batavorum milliaria* was moved in Potaissa and was active under the command of M(arcus) Publicianus Rhe[n]us. This character is mentioned in two inscriptions discovered in one of the buildings belonging to the thermal complex from the *praetentura dextra* of the Roman fortress. What is more interesting is the Publicianus' function recorded in the epigraphs: *prae(ectus) alae I (primae) Bat(avorum) (milliariae) [a]gens vice prae(ecti) leg(ionis)*.⁶⁷ Therefore, in an exceptional moment, during Gallienus' reign, when part of the legion was sent away from Potaissa, the troop from Războieni served to strengthen the defence in Potaissa, because it was the closest troop from Potaissa. Again, the location and the arrangement of the fort along the imperial road in Dacia proved to be very important in crucial moments.

4. 5. 5. Sutoru (Sălaj County)

The fort of Sutoru, first archaeologically identified in 2002,⁶⁸ is located 30 miles north-west from Napoca. From Sutoru to Porolissum there are 24 Roman miles along the Roman road. A *numerus Maurorum Optatianensium* was garrisoned here in a fort of 165 × 220 m.⁶⁹ Therefore, the military unit located here could serve to control the Roman road in this area.

5. FINAL REMARKS

It is quite remarkable to analyze and understand how Romans have used the terrain, the landscape, to organize, administrate and rule a new province. Not only in the case of Dacia, but also in many other situations, they used at maximum the potential of the relief when they projected and built roads, cities, forts, fortresses, *burgi*, and different others elements of the landscape. Therefore, one should be aware that in the case of Dacia, the building of the roads and the location of the new forts started right from the beginning, during the first Dacian war, in 101-102 A.D. These outstanding engineer achievements continued during the second Dacian war in 105-106 A.D. and obviously after the creation of the new province in 106 A.D.

BIBLIOGRAPHY AND REFERENCES

- ANTONESCU 1910
Antonescu, T., *Columna Traiană studiată din punct de vedere arheologic, geografic și artistic* (Iași).
- ARDEȚ/ARDEȚ 2004
Ardeț, A., Ardeț, L. C., 2004, *Tibiscum. Așezările romane* (Cluj-Napoca).
- ARDEVAN 1998
Ardevan, R., *Viața municipală în Dacia romană* (Cluj-Napoca).
- BAATZ 1984
Batz, D., *Qellen zur Bauplanung römischer Militärlager, Bauplanung und Bauthorie der Antike, Diskussionen zur archäologischen Bauforschung* 4, 315-325.
- BAJUSZ 2011
Bajusz, I., *Amfiteatrul de la Porolissum și amfiteatrele din*

provinciile romane dela Dunărea de Mijloc (Cluj-Napoca).

- BĂRBULESCU 1999
Bărbulescu, M., Traian și descoperirea Daciei. In: Protase, D., Brudașcu, D. (eds.), *Napoca. 1880 de ani de la începutul vieții urbane* (Cluj-Napoca), 32-38.
- BĂRBULESCU 2012
Bărbulescu, M., *Inscripțiile din castrul legionar de la Potaissa. The Inscriptions of the Legionary Fortress at Potaissa* (Bucharest).
- BECATTI 1982
Becatti, G., *La Colonna Traiana, espressione somma del rilievo storico romano*, ANRW II, 12, 1, 536-578.
- BENEA 1983
Benea, D., *Din istoria militară a Moesiei Superior și a Daciei. Legiunea a VII-a Claudia și legiunea a IIII-a Flavia* (Cluj-Napoca).
- BENEA/CÎNTAR 2015
Benea, D., Cîntar, A., *Arterele de comunicație din vicus-ul militar de la Tibiscum*. In: Alpár, D., Dávid, P., Sándor, B., Lóránt, V., Szilamér Péter, P., Kovács Zsolt, M., Péter F. (eds.), *Archaeologia Transylvanica. Studia in honorem Stephani Bajusz* (Cluj-Napoca/Târgu Mureș/Budapest), 125-131.
- BENEA/REGE 2016
Benea, D., Regep S., *Câteva precizări privind topografia monumentelor de la Tibiscum*. In: Micle, D., Stăvilă, A., Oprean, C., Forțiu, S. (eds.), *Arheovest IV/1. In honorem Adrian Bejan. Interdisciplinaritate în Arheologie și Istorie* (Szeged), 321-352.
- BENNETT 1997
BENNETT, J. 1997, *Trajan, Optimus Princeps: A Life and Times* (Bloomington, London-New York).
- BLĂJAN/CERGI 1978
Blăjan, M., Cerghi, T., *Descoperiri romane și postromane la Aiton* (jud. Cluj), *Potaissa. Studii și comunicări* 1, 21-27.
- BOJOVIĆ 1996
Bojović, D. 1996, *Le camp de la légion IV Flavia à Singidunum*. In: Petrović, P. (ed.), *Roman Limes on the Middle and Lower Danube* (Beograd), 53-68.
- BOŠKOVIĆ 1978
Bošković, D., *Aperçu sommaire sur les recherches archéologiques du Limes romain et paléobyzantin des Portes de Fer, Mélanges de l'Ecole française de Rome, Antiquité* 90, 1, 425-463.
- BURGHARDT 1979
Burghardt, A. F., *The origin of the road and city network of Roman Pannonia*, *Journal of Historical Geography* 5, 1, 1-20.
- CAMBELL 2004
Cambell, B. (ed.) 2004, *Greek and Roman military writers. Selected readings* (London/New York).
- COULSTON 2001
Coulston, J., *Transport and travel on the Column of Trajan*. In: Adams, C., Laurence, R. (eds.), *Travel and Geography in the Roman Empire* (Routledge, London/New York), 106-137.
- CRIȘAN/TIMOC 2004-2005
Crișan, D.S., TIMOC, C., *Inginerii împăratului Traian (I). Mensorul Balbus (Die Ingenieure Kaisers Trajan (I). Balbus der Mensor)*, *Analele Banatului* 12-13, 157-170.
- CUPCEA 2011
Cupcea, G., *Veteran settlement and Colonia Ulpia Traiana Sarmizegetusa*. In: Piso, I., Rusu-Bolindeț, V., Varga, R., Mustață, S., Beu-Dachin, E., Ruscu, L. (eds.), *Scripta Classica. Radu Ardevan sexagenario dedicata* (Cluj-Napoca), 247-255.
- DIACONESCU 1997
Diaconescu, A., *Dacia under Trajan. Some observations on*

⁶⁷ BĂRBULESCU 2012, 187-212.

⁶⁸ MARCU 2009, 114.

⁶⁹ MARCU 2009, 114.

- Roman tactics and strategy, *Acta Musei Napocensis* 34, I, 13-52.
- FLUTUR 2011
Flutur, Al., Clădirile comandamentului din castrul de legiune traianic de la Berzobis, *Analele Banatului* S.N. XIX, 145-160.
- FODOREAN 2001
Fodorean, F., The via silica strata Geoagiu-Băi - Cigmău. Archaeological, geo-topographic and technical study, *Acta Musei Napocensis* 38/1, 203-220.
- FODOREAN 2006
Fodorean, F., *Drumurile din Dacia romană* (Cluj-Napoca).
- FODOREAN 2007
Fodorean, F., Drumul roman imperial Sarmizegetusa-Subcetate. Studiu topografic și arheologic. In: Nemeti, S., Fodorean, F., Nemeth, E., Nemeti, I., Pislaru, M. (eds.), *Dacia Felix. Studia Michaeli Bărbulescu oblata* (Cluj-Napoca).
- FODOREAN 2012
Fodorean, F., Die Strassen des Römischen Dakien. Forschungsstand, neue Entdeckungen und Perspektiven der Forschung, *Gymnasium. Zeitschrift für Kultur der Antike und Humanistische Bildung*, 119, 255-279.
- FODOREAN 2015
Fodorean, F., 'A Potaissa Napocae MP X'. The Roman rural settlement and the mansio from Aiton (Cluj County), *Acta Archaeologica Academiae Scientiarum Hungaricae* 66, 217-232.
- FODOREAN 2016
Fodorean, F., *Pannonia, Dacia and Moesia in the Ancient Geographical Sources* (Stuttgart).
- GABRIČEVIĆ 1972
Gabričević, M., Straßenbau in der Donja Klisura des Eisernen Tores im Licht der neuentdeckten Inschrift, *Arheološki Vestnik* 23, 408-416.
- GALLIAZZO 1994
Galliazzo, V., *I ponti romani. Catalogo generale*, vol. 2 (Treviso).
- GUDEA 1988
Gudea, N., Contribuții epigrafice la cunoașterea sistemului vama al Daciei romane. Vama de la Porolissum, *Acta Musei Porolissensis* 12, 175-189.
- GUDEA 1989
Gudea, N., *Porolissum. Un complex arheologic daco-roman la marginea de nord a Imperiului roman*. I, (Zalău, *Acta Musei Porolissensis* 13).
- GUDEA 1996
Gudea, N., *Porolissum. Un complex daco-roman la marginea de nord a Imperiului Roman*. II. Vama romană. Monografie arheologică (Cluj-Napoca).
- GUDEA 2001
Gudea, N., *Die Nordgrenze der römischen Provinz Obermoesien. Materialien zu ihrer Geschichte (86-275 n.Chr.)* (Mainz).
- GUDEA/TAMBA 2001
Gudea, N., Tamba, D., *Despre templul zeului Iupiter Dolichenus din municipium septimium Porolissensum / Über ein Jupiter Dolichenus Heiligtum in der municipium septimium Porolissensum* (Cluj-Napoca).
- HANSON/OLTEAN 2003
Hanson, W. S., Oltean, I., The identification of Roman buildings from the air: recent discoveries in Western Transylvania, *Archaeological Prospection* 10/2, 101-117.
- MARCU 2009
Marcu, F., *The Internal Planning of Roman Forts of Dacia* (Cluj-Napoca).
- MATEI 2005
Matei, A., Apeductele romane pe piloni de la Porolissum. In: Mușțeanu, C., Bărbulescu, M., Benea, D., *Corona laurea*. Studii în onoarea Luciei Țeposu Marinescu (Bucharest), 293-311.
- MICLEA/FLORESCU 1980
Miclea, I., Florescu, R., *Decebal și Traian* (Bucharest).
- MEDELEȚ/PETROVSKI 1974
Medeleț, F., Petrovski, R., Cercetări arheologice în castrul de la Berzovia, *Tibiscus* 3, 134-136.
- MEDELEȚ/FLUTUR 2002
Medeleț, F., Flutur, Al., Castrul roman de la Berzovia. Istoricul cercetărilor arheologice, *Patrimonium Banaticum* I, 95-100.
- MILNER 1993
Milner, N. P., *Vegetius: Epitome of Military Science* (Liverpool University Press).
- MIRKOVIĆ 1996
Mirković, M., The Iron Gates (Djerdap) and the Roman Policy on the Moesian Limes A.D. 33-117. In: Petrović, P. (ed.), *Roman Limes on the Middle and Lower Danube* (Belgrade), 27-40.
- MIRKOVIĆ 2007
Mirković, M. 2007, *Moesia Superior: Eine Provinz an der Mittleren Donau (Zaberns Bildbände zur Archäologie. Sonderbände der antiken Welt)* (Mainz).
- MOGA 1970
Moga, M., Pagus Tibisciensis. În legătură cu teritoriul rural al Ulpiei Traiana, *Tibiscus* 1, 41-50.
- MOGA 1971
Moga, M., Castrul Bersobis, *Tibiscus* 1, 51-58.
- NEMETH 2005
Nemeth, E., *Armata în sud-vestul Daciei romane / Die Armee im Südwesten des römischen Dakien* (Timișoara).
- NEMETH 2005
Nemeth, E., *Politische und militärische Beziehungen zwischen Pannonien und Dakien in der Römerzeit (Relații politice și militare între Pannonia și Dacia în epoca romană)* (Cluj-Napoca).
- NEMETH 2016
Nemeth, E., *Granița de sud-vest a Daciei romane - elemente de structură și tipologie*. In: Teodor, E. S. (ed.), *Arheologia peisajului și frontierele romane* (Târgoviște), 221-240.
- NEMETH/FODOREAN/MATEI/BLAGA 2011
Nemeth, E., Fodorean, F., Matei, D., Blaga, D., *Der südwestliche limes des römischen Dakien. Strukturen und Landschaft* (Speculum Antiquitatis 1) (Cluj-Napoca).
- NICOLET 1991
Nicolet, C., *Space, Geography, and Politics in the Early Roman Empire* (Ann Arbor, University of Michigan Press).
- OLTEAN 2007
Oltean, I., *Dacia. Landscape, colonisation and romanisation* (Routledge).
- OPREANU 2006
Opreanu, C. H., Activitatea constructivă a legiunii III Flavia Felix la nordul Dunării în anii 101-117 d. Ch. In: Teodor, S., Țentea, O. (eds.), *Dacia Augusti Provincia. Crearea provinciei* (Bucharest), 51-74.
- OPREANU 2016
Opreanu, C. H., From Legionary Fortress to a Veteran Colony. The Case of Ulpia Traiana Sarmizegetusa in Dacia, *Ikarus* 10, 206-226.
- OPREANU/LĂZĂRESCU 2015
Opreanu, C. H., Lăzărescu, V., Porolissum. A Roman Fort and Town on the Northern Frontier of the Roman Empire. In: Vagalinski, L., Sharankov, N. (eds.), *Limes XXII. Proceedings of the 22nd International Congress of Roman Frontier Studies Bulgaria* (Ruse), 901-907.
- OPREANU/LĂZĂRESCU/ȘTEFAN 2013
Opreanu, C. H., Lăzărescu, V., Ștefan, D., Noi cercetări la

- Porolissum, *Analele Banatului* S.N. 21, 83-106.
- O'CONNOR 1993
O'Connor, C., *Roman Bridges* (Cambridge University Press).
- PISO 2010
Piso, I., Il Capitolium, l'Epulum Iovis e il Dies Iovis nella Dacia Romana. In: Zerbini, L. (ed.), *Roma e le province del Danubio. Atti del I Convegno Internazionale Ferrara - Cento, 15-17 Ottobre 2009* (Soveria Manelli), 269-278.
- PETROVIĆ 1986
Petrović, P. 1986, La voie romaine des Ports de Fer, *Starinar* 37, 41-47.
- POPOVICI/VARGA 2010
Popovici, P., Varga, R., *Ad Vatabos. Monografie arheologică a localității Războieni-Cetate* (Cluj-Napoca).
- PROTASE 1967
Protase, D., Legiunea III Flavia la nordul Dunării și apartenența Banatului și Olteniei de vest la provincia Dacia, *Acta Musei Napocensis* 4, 47-72.
- PROTASE 2008
Protase, D., *Castrul roman de la Orheiul Bistriței. Das Römische Kastell von Orheiu Bistriței* (Cluj-Napoca).
- RANCU 2014
Rancu, D., Cercetări arheologice preventive la Berzovia, *Banatica* 24/1, 57-66.
- ROBY 2014
Roby, C., Experiencing Geometry in Roman Surveyors' Texts, *Nuncius* 29, 9-52.
- ROSSI 1968
Rossi, L., The Representation on Trajan's Column of Trajan's Rock-cut Road in Upper Moesia, *The Antiquaries Journal* 68, 41-46.
- RUSU-BOLINDEȚ 2007
Rusu-Bolindeț, V., *Ceramica romană de la Napoca. Contribuții la studiul ceramicii din Dacia romană* (Cluj-Napoca).
- RUSU-BOLINDEȚ/ONOFREI 2010
Rusu-Bolindeț, V., Onofrei, C., Date noi privind activitatea militară și cultura materială a alei I Batavorum de la Războieni-Cetate. In: Rusu-Bolindeț, V., Sălăgean, T., Varga, R. (eds.), *Studis archaeologica et historica in honorem magistri Dorin Alicu* (Cluj-Napoca), 396-442.
- SALWAY 2001
Salway, B., Travel, itineraria and tabellaria. In: Adams, C., Laurence, R. (eds.), *Travel and Geography in the Roman Empire* (London - New York, Routledge), 22-66.
- ŠAŠEL 1973
Šašel, J., Trajan's Canal at the Iron Gate, *The Journal of Roman Studies* 6, 80-85.
- SHERK 1974
Sherk, R. K., Roman Geographical Exploration and Military Maps, *ANRW* II, 1, 534-562.
- ȘTEFAN/OPREANU/LĂZĂRESCU 2013
Ștefan, D., Opreanu, C. H., Lăzărescu, V., Recent geophysical surveys at Porolissum. In: Stavilă, A., Micle, D., Cîntar, A., Floca, C., Forțiu, S. (eds.), *Arheovest I. In memoriam Liviu Măruia. Interdisciplinaritate în Arheologie și Istorie* (Szeged), 509-524.
- TIMOC 2001
Timoc, C., Despre dirijarea navigației fluviale în zona Porților de Fier ale Dunării în epoca romană. In: Benea, D. (ed.), *In memoriam Dumitru Tudor (Timișoara)*, 97-116.
- VULPE 1988
Vulpe, R., *Columna lui Traian. Monument al etnogenezei românilor* (Bucharest).
- VUČKOVIĆ/MIHAJLOVIĆ/KAROVIĆ 2007
Vučković, D., Mihajlović, D., Karović, G., Trajan's Bridge on the Danube. The current results of underwater archaeological research, *Istros* 14, 119-130.
- WHITTAKER 2004
Whittaker, C., *Rome and its frontiers: the dynamics of Empire* (Routledge, London-New York).
- WINKLER 1982
Winkler, I., Date noi despre CIL III, 1627, cea dintâi atestare epigrafică a Potaissaei, *Potaissa. Studii și comunicări* 3, 80-84.
- WINKLER/BLĂJAN/CERGIHI 1980
Winkler, I., Blăjan, M., Cerghi, T., Drumul roman Napoca-Potaissa. I, *Potaissa. Studii și comunicări* 2, 63-73.
- ZAHARIADE 2011
Zahariade, M., Castrul roman de la Berzovia, 1977. Cercetări arheologice în canabae și în castrul roman, *Bibliotheca Historica et Archaeologica Universitatis Timisiensis* XIII, 101-124.



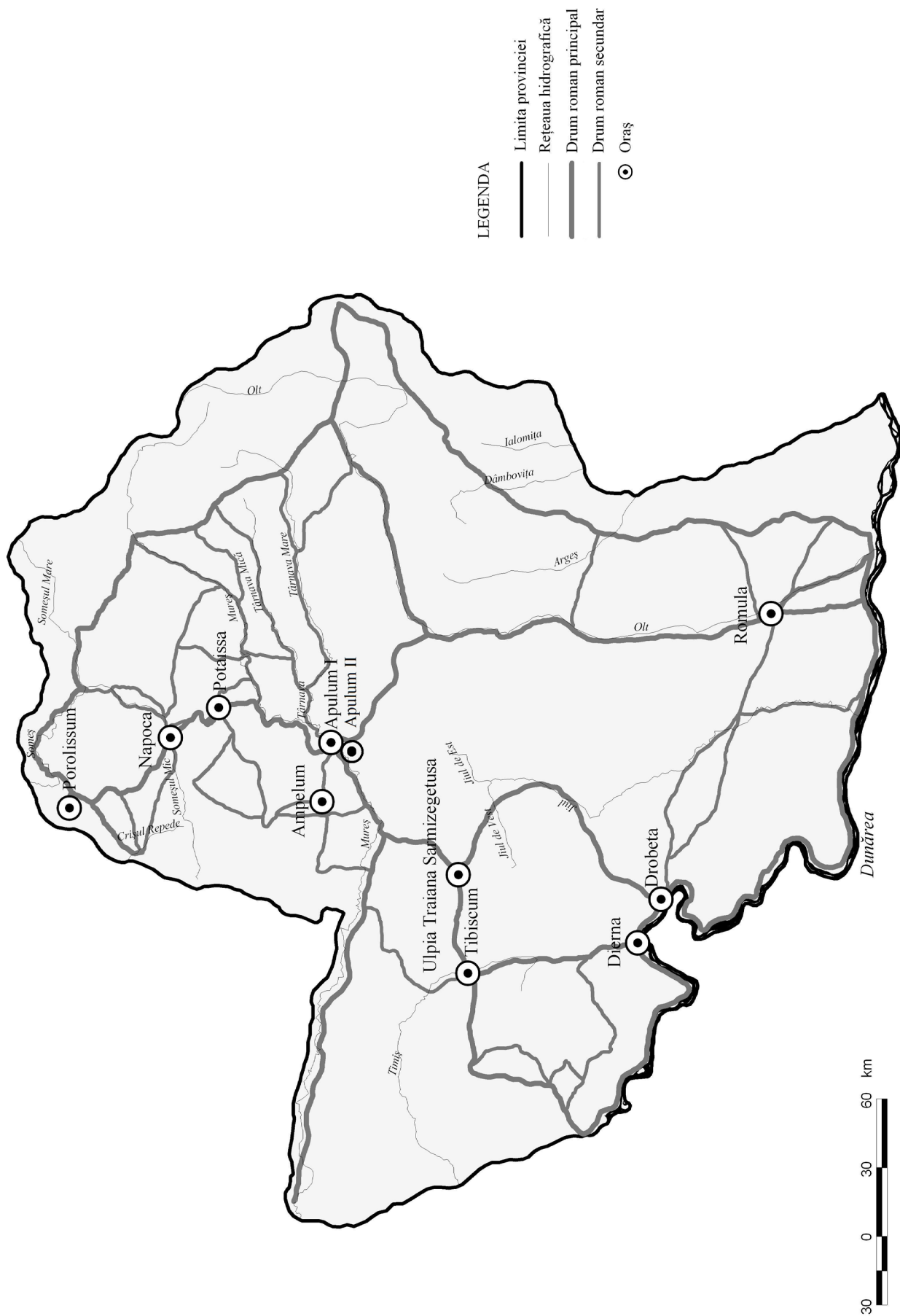


Fig. 2. The municipia and coloniae in Roman Dacia.

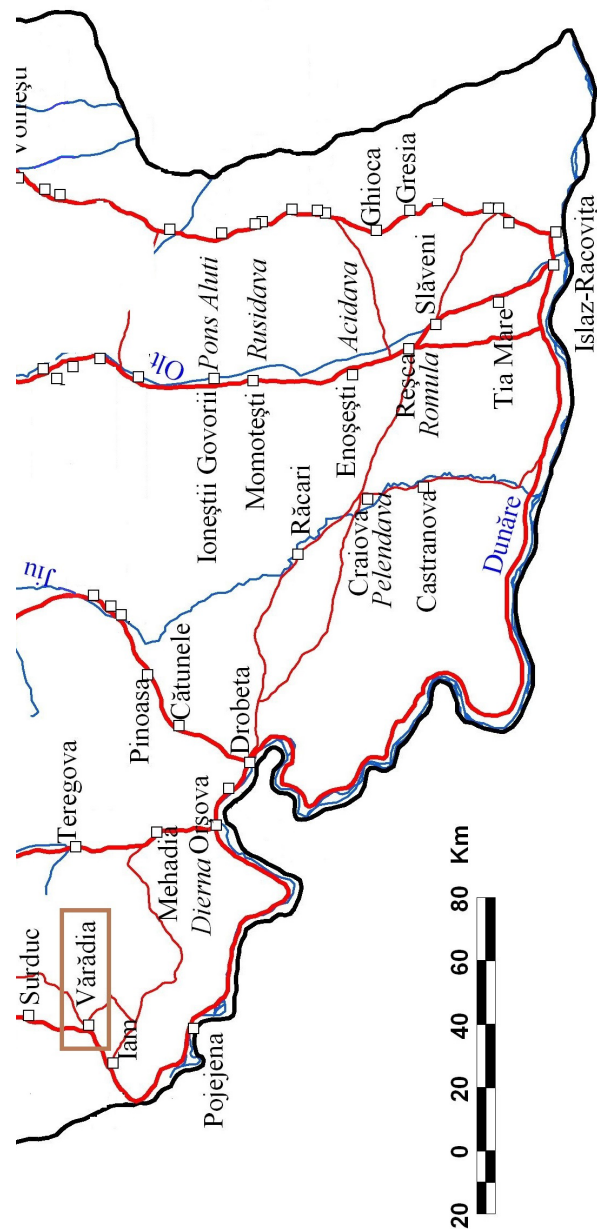
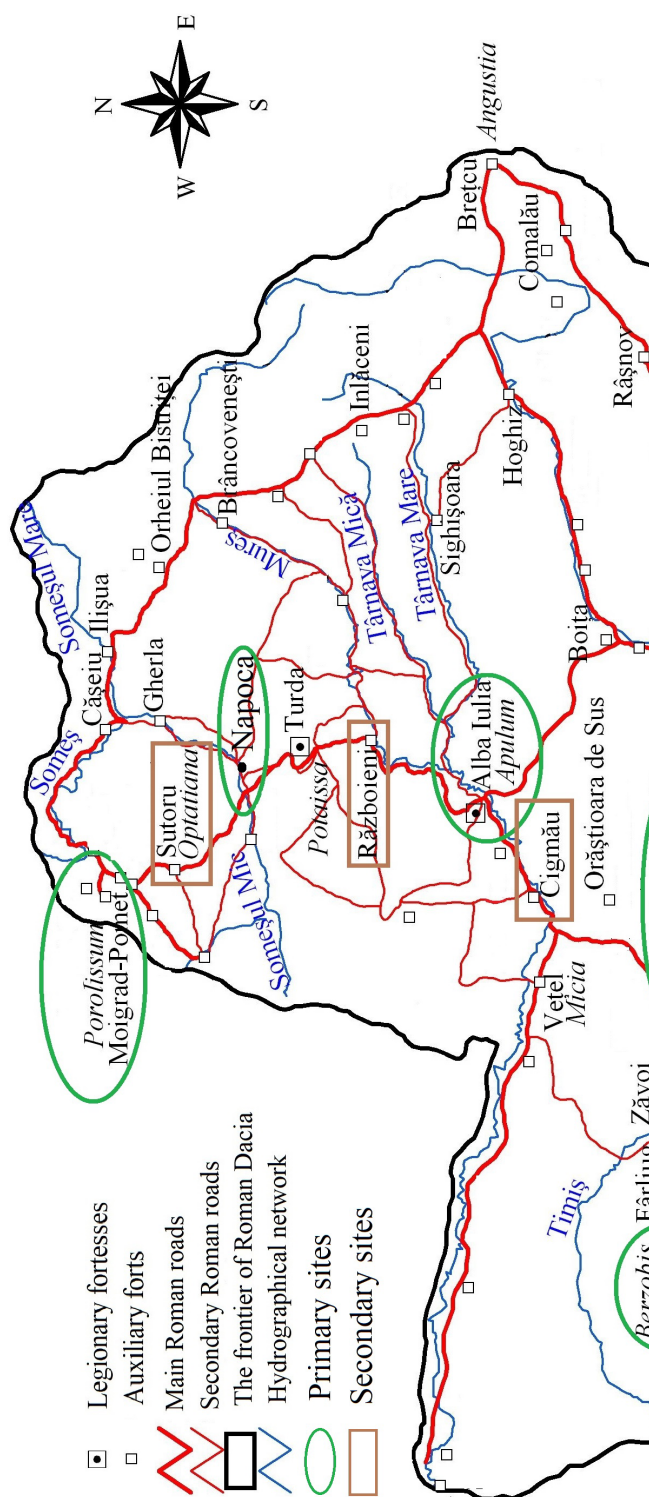


Fig. 3. Primary and secondary sites along the main imperial road from Dacia.