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On the digital placement of Aegae, the first capital of ancient Macedonia, according to Ptolemy's *Geographia*

Keywords: Ptolemy's *Geographia*; ancient Macedonia; ancient Aegae; Ptolemy's coordinates.

Summary

The position of *Aegae*, the first capital of ancient Macedonia, detains the archaeological and historical research since the 19th century. The impressive discoveries of Manolis Andronikos in 1978 have lead to the view that Aegae was situated in the archaeological site near the modern village of Vergina. However, during the last years this theory is not being unanimously accepted. The lack of relevant inscriptions forces the scholars to search for data in other archaeological founds and the ancient sources. One of these sources, of important scientific value, is the *Geographia* of Claudius Ptolemy. In this treatise Ptolemy gives the coordinates of ca 8000 ancient sites of the world that was known to him. Among these sites is Aegae. It is important to stress that in the first of the eight books that constitute *Geographia*, Ptolemy explains in detail all the methods he uses in his work, most of which remind us of the method of another pioneer scientist of ancient Greece, Thucydides. In this paper, coordinate-wised digital methods are applied in order to locate Ptolemy's Aegae, with respect to surrounding control point coordinates which are archaeologically assured as common in *Geographia* and in our modern cartographies. The estimated results are critically discussed, with respect to existing archaeological scenarios.

Introduction

According to the legend, the *Temenids*, the descendants of Heracles, expelled from Peloponnesus have arrived to the "Macedonian land", where they established, in the mid 7th century B.C., the Macedonian kingdom, centred at the city of *Aegae*. This city became the capital of the kingdom for almost one and a half centuries preserving later on its prestige as the ceremonial royal necropolis of the Macedonian state. The issue of identifying Aegae has engaged the historical and archaeological research since the 19th century and numerous relevant theories have been addressed in the specialized literature. According to those theories, the ancient Macedonian capital is placed either at the city of Edessa or at its wider area (in Faklaris 1994: 609-610 with all relevant bibliography), or at the archaeological site of Vergina (Hammond 1970: 64-65; 1997: 177-179; more in Drougou 2002-2203: 129-131; 2005: 4, n. 2; Saatsoglou-Paliadeli 2001: 201-207; 2003: 35), or at the area of Kopanos – Lefkadia to the east of the city of Naoussa. According to the latter theory Vergina should be identified with the ancient city of Valla (Faklaris 1994: 609 f.).

The lack of epigraphic inscriptions which could solve definitively the issue imposes the research in looking data in other archaeological findings and in written sources. Among such sources is the well-known to cartographers Ptolemy's *Geographia*, written in the 2nd century A.D. In the first of *Geographia's* eight books, in which Ptolemy gives a theoretical introduction, the methods followed in his work are exposed in detail. This is done in the form of instructions for the determination of the positions of the sites listed in his coordinate catalogue and for the map construction in different projections. The spherical geographic coordinates, in five minutes of arc resolution, are given in the next six books and in the last eighth twenty six regions of the known universe are displayed (Lennart Berggren and Jones 2000, with relevant bibliography). In *Geographia's* third book, in the tenth table *Hellas*, Ptolemy

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lists the coordinates of a large number of sites grouped in regions. In the region of Macedonia, under the province of Emathia in chapter III.13.39, according to Nobbe's (1843-1845) chapter numbering which is followed in this study, the four last cities are Edessa, Veroia, Aegae and Pella.
In this study the interest is focused on the placement of Aegae, the first capital of ancient Macedonia, according to Ptolemy's *Geographia* (Manoledakis 2005). This is attempted by using the coordinates given in Ptolemy's list, applying a number of relevant transformations in order to fit them optimally to actual coordinate values according to the methods used in mapping sciences and technologies for the comparison of homologous sets of coordinates (see e.g. Boutoura and Livieratos 2006: 60).

On the probable location of Aegae

It is evident that the supporters of the older theory concerning the possible location of Aegae, as coinciding with the city of Edessa, have not taken Ptolemy's *Geographia* under consideration. The same holds also for the later scholars who dealt with the issue. Though they are aware of *Geographia* they never dived into its full and detailed analyses. Hammond (1970: 65; 1972: 157; 1997: 178), who was the first to identify Aegae with Vergina, has mainly based on other written sources and despite the fact that he was the first who used properly Ptolemy, he did so only to prove the non coincidence of Aegae with Edessa. Andronikos (1984: 59, 234; 1997: 61) did the same, accepting Hammond's reasoning about the identification of Aegae with Vergina, while his placement of the Macedonian capital at Vergina was based on other sources and principally, of course, on the archaeological findings, such as the palace, the theatre, the *royal tombs* and the royal votive offerings (Andronikos 1976: 127-128; 1984: 24, 38, 51; 1986: 35-36). All other researchers and specialist either used Ptolemy to disconnect Aegae from Edessa or gave no reference at all to the great Alexandrian geographer. Up to now, in the historical and archaeological reasoning about Aegae, Ptolemy's data were either totally ignored, as it was the case of those supporting the identification of Edessa with Aegae, or were approached erroneously (see, e.g., Heuzey and Daumet 1876: 181[1]) or they were considered as unreliable abandoning thus, any effort for further investigations. Faklaris (1994: 612-613) approached Ptolemy with reservation, observing that the geographer is referring generally to the area of Emathia without determining the exact placement of each town in it. This observation is done despite the fact that the positioning of each town is given explicitly with spherical geographic coordinates. The value of these coordinates was also contested by other scholars (Heuzey and Daumet 1876: 183[2]; Flensted-Jensen 1995: 113[3] and Hatzopoulos and Loukopoulou 1989: 85; Müller 1883: 518[4]).
This lack of concrete interest about Ptolemy's text, in searching Aegae, is indeed remarkable, even if in this text the first ever known digital position determination of Aegae can be found. On the contrary, a variety of other written sources were extensively used, which refer either to prophecies and legends relevant to the establishment of the Temenids in Macedonia, or to the placement of the so called "Gardens of Midas", from where the expansion of the Macedonian kingdom was originated, or to meteorological phenomena which took place in various sites, as in Aegae, the position of which remained undefined, or to other historical facts, like the revolt of Argaeus or the despoilment of the Macedonian tombs in Aegae by the Gauls, the narration of which does not offer any evidence about the positioning of

[1] They point out that, according to Ptolemy, the city of Valla lies 15' to the west of Haliacmon's mouths and 10' to the east of the city of Phylacae, instead of 10' and 20' respectively, as Ptolemy in fact reports (III.13.40).

[2] *"Rien n'est plus trompeur que les prétendues données mathématiques de la géographie de Ptolémée"* and *"Ptolémée s'est laissé abuser par la vaine prétention de construire avec des chiffres la géographie de ces contrées"*.

[3] *"Ptolemaios is in fact not a reliable source... "*

[4] He comments that Ptolemy falsely distinguishes Aegae from Edessa!

Aegae. In other words, all these information are not strong enough to lead to a reliable positioning, even when they are not part of some legend and myth.

Ptolemy's methodology

The methodology followed by Ptolemy in describing and representing the world is given by the geographer himself in the first book of his *Geographia.* He makes clear from the very beginning that in order to draw a map of *Oikoumene,* as close to reality as possible, it is necessary to make before a systematic research. This requires the collection of all knowledge available to the cartographer from reports by people with scientific preparation who travelled around the world. The cartographer then studies and compares these reports with his own data which are mainly topographic and astronomic observations and measurements (see ?.2.2). Ptolemy's methodology gains the interest of the modern scholar even from the early stage of reading *Geographia.* It is worth noticing also the surprising similarities with the method followed by another pioneer scientist of the antiquity Thucydides, as he states it in the introduction of his own work, some centuries earlier.

In the 5th century B.C. Thucydides says, that some part of what he wrote was learned thanks to people from different origins that hear from others and the rest he learned himself, but, in any case, he assures us that the validity of all the input he got was controlled and crossed by him (see ?.22). This, of course, does not mean that both Thucydides and Ptolemy were infallible. Ptolemy explains further, the difference between the topographic and astronomic research as well as the reasons due to which both are valuable. Topography has to do with the relative position of places according to the measured distance between them while astronomy determines the place position with the aid of astronomic measurements. The geographer believes that if all people that travelled around the world and made their reports available could make astronomic determinations, then the construction of a world map with minimal errors could be possible to be made (?.4.1). An example is the reporting of a lunar eclipse in a number of places as it is the famous of September the 20th night, 331 B.C., eleven days before the battle at Gaugamela. This eclipse was recorded at 5 o'clock at the city of Arbela and at 2:00 at the city of Carchedon (?.4.2). This three hours difference corresponds to ca 45 degrees difference in longitude and this is the difference in longitude (45^{o} 10') given by Ptolemy in determining the longitude of these two cities (J. Lennart Berggren and A. Jones 2000: 29-30). In addition, Ptolemy claims important not only the astronomic observations as such but also their comparison with the relevant reporting of others, like Hipparchus or Marinus, recalling in this Thucydides who asked the crosschecking of evidences from many different sources, knowing that every man could offer his own version to the same event (see ?.22). But the methodological similarities among these two scientists are not exhausted here. Both believed that the passing of time contributes at the reduction of the correctness in the results of a historical or geographical research (Thuc. ?.1, Ptol. ?.5.2). They were also very distrustful about the earlier reporting *…as people tend to accept uncritically what they hear for the past… and they are disinclined to enter in the fatigue to search for the truth…* (Thuc. ?.20), and especially about the geographic references, since *…many places were described erroneously because of the inattention of those who described them…* (Ptol. ?.5.2).

In *Geographia,* Ptolemy follows the most recent reports by travellers and geographers of his ages, Marinus is one of them, and he is careful, as it was Thucydides, in distinguishing the reliable information from the unreliable. He corrects the latter, crossing them with the aid of astronomical observations and determines the boundaries of regions giving lists of spherical coordinates (longitude – latitude) in degrees and primes (with a five primes resolution) for a great number of cities and other geographical entities which, according Ptolemy, deserves representation on a map. In this way he determines the position of each place and region with respect to each other and to the Oikumene (?.19.3) making also reference to the most significant nations inhabiting each region (?.19.1-2). Having followed the basic points

of Ptolemy's methodology we can perceive the reason why this major work is considered as the culmination of the geographic and cartographic knowledge and practice of the antique world in which all the up to date know-how is completely codified and documented. Comparing to Thucydides, Ptolemy's work could be considered at the same height, as far as the methodology is concerned, and the accepted scientific criteria by both, leaving only some space for a certain caution about the reliability of Ptolemy's work compared to Thucydides', since Ptolemy dealt mainly with the implacable world of numbers!

The coordinates in *Geographia*

But what are really those numbers, which are the real core of Ptolemy's *Geographia?* They are pairs of spherical coordinates of the type longitude and latitude counted on a spherical earth of uncertain size. The reference of these coordinates are the Equator for the latitudes and a more or less uncertain zero meridian for the longitudes, passing from the "Fortunate Islands", the actual Canaries, almost 15° west of Greenwich. Depending on the high level of accuracy gained up to the times of Ptolemy in the determination of latitude, the angular distances from the Equator were fairly well measured. This is not the case for the determination of longitude, which as a measure of time suffered severe limitations and shortcomings[5]. For this very reason, point positioning in Ptolemy's earth is a really uneasy task for those not familiar with geodetic sciences. Especially concerning longitude, a non-expert who will attempt to report the coordinates given in *Geographia* in terms of today's longitude risks to arrive to misleading conclusions. In such case, e.g., the city of Aegae, on which we focus our interest in this paper, given by Ptolemy with longitude 48° 40' or 48,67° and latitude 39° 40' or 39,47° (see ???.13.39) correspond to a location in the actual SE Azerbaijan, indeed far away from the land of Macedonia! This apparent gross "mistake" perhaps is the reason, for a number of archaeologists and historians dealt with the issue of Aegae, for neglecting Ptolemy's *Geographia* in their reasoning as a geographic backing document.
But the reality of Ptolemy's coordinates, even with the limitations in the longitude determination, is much more complicated deserving serious attention and care. For the area of the Mediterranean, a look into the comparison of coordinates, given by Ptolemy with their actual counterparts (Livieratos 2006: 165), shows an increasing trend of longitude differences eastwards. From ca 14,5^{o} at the "Columns of Heracles" to ca 26,5^{o} at the area of Aegae and ca 32^{o} at the east coasts of Cyprus. It is not the same for the latitude differences which never exceed -3^{o} to 2^{o}. For the actual territory of Greece the latitude differences varies from -1^{o} to 1^{o} with the latitude difference close to Aegae not exceeding -0.5^{o}.
The process with which the point coordinates were determined is not known with certainty. Speculations converge to the idea that some of the points were determined by in situ latitude and longitude observations and the majority of the rest of points by a sort of step by step relative determination of coordinates starting from known positions of close points. This is something which is also hinted by Ptolemy himself (see ?.19.3). So it is likely to plan the analysis of the coordinates given in *Geographia* based on a scheme involving relative point coordinates (coordinate differences) rather than the absolute coordinates given as raw data in Ptolemy's lists.

[5] This problem was solved quite late, only in the 17th century for land determinations of longitude and a century later for accurate sea determinations.

Ptolemy's positioning of Aegae

Baseline analysis

The position of Aegae mentioned in Ptolemy's *Geographia* is referred to the site existed at that epoch. It is worth noticing here, that Ptolemy's text is also important for the documentation of the existence of a city named Aegae in the Roman period. This is also confirmed by two epigraphic inscriptions found in Lefkopetra, Emathia, dated from the 3rd century A.D. For these epigraphic inscriptions from 229 and 253 A.D., see Petsas et al. (2000: 136-137, n. 73; 163-164, n. 103) with all relevant bibliography. It is to be proved that the city recorded in *Geographia* coincides with the first capital and, later on, royal necropolis of Macedonians. Ptolemy's distrust to earlier sources is known as well as his belief that the cities are changed or destroyed in the course of time. As we have already mentioned, the geographer (see ?.5.2) follows the reports of his contemporary travellers and geographers which he insists to crosscheck, update and correct.

In designing a strategy for the positioning of Ptolemy's Aegae in the actual geography of the region, using the local list of coordinates in *Geographia,* the following scheme can be followed: First, some neighbouring sites are identified, to be used as the control sites for the determination of the placement of Aegae. These control points have known coordinates in Ptolemy's list and are identified in the actual geography of the site. In the case of Aegae the cities which could be used as control neighbouring points are the closest Edessa, Pella, Veroia, Dion, Pydna and in some distance Larissa and Trykki (Fig. 1). To all points, spherical coordinates are assigned both in *Geographia* and in actual geography. Then all combinations of baselines between the control points are taken and their longitude and latitude coordinate differences ?? and ?f are computed as listed in *Geographia* and in actual geography.

The relevant results are given in Tab. 1 for the longitude differences and in Tab. 2 for the latitude differences. Observing the results in Tab.1 and Tab. 2 it is evident that the differences in longitude are in majority larger, exceeding half degree, while the differences in latitude are less than this figure. In Tab. 3, the resultants of ?? and ?f baseline differences are given, from which it is shown that only the three baselines Edessa – Pella, Edessa – Veroia and Pella – Veroia present differences ? 0,25 degrees (15 minutes of arc). All the rest differences are much more than 40%.

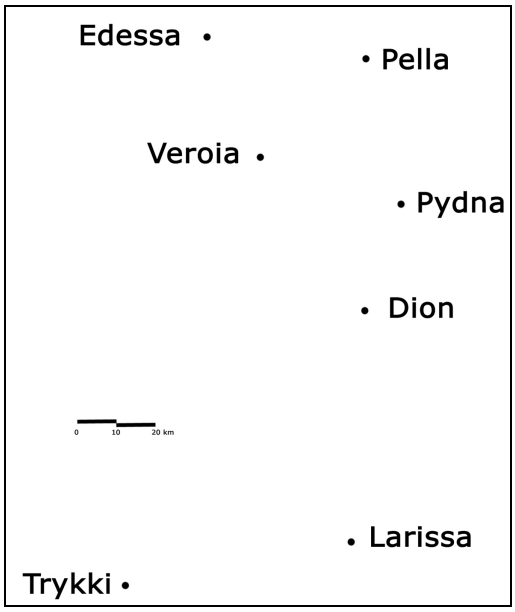

Figure 1. The seven control points close to the city of Aegae as determined in Ptolemy's *Geographia.* Here, the placement of the cities is according to their actual positioning.

	Edessa	Pella	Veroia	Pydna	Dion	Larissa	Trykki
Edessa		**-0,58** ***-0,48***	**0,00** ***-0,15***	**-1,08** ***-0,56***	**-1,25** ***-0,43***	**-1,25** ***-0,37***	**0,67** ***-0,38***
Pella	0,10		**0,58** ***0,33***	**-0,50** ***-0,08***	**-0,67** ***0,05***	**-0,67** ***0,11***	**1,25** ***0,10***
Veroia	0,15	0,25		**-1,08** ***-0,41***	**-1,25** ***-0,28***	**-1,25** ***-0,22***	**0,67** ***-0,29***
Pydna	0,52	0,42	0,67		**-0,17** ***0,13***	**-0,17** ***0,19***	**1,75** ***0,18***
Dion	0,83	0,72	0,97	0,30		**0,00** ***0,06***	**1,92** ***0,05***
Larissa	0,88	0,78	1,03	0,36	0,06		**1,92** ***-0,01***
Trykki	1,05	1,17	0,96	1,57	1,87	1,93	

Table 1. The matrix of baseline longitude differences (??) in degrees.
Upper triangular part: Baseline differences in Ptolemy's ?? (bold) and differences in actual ?? (italic).
Lower triangular part: Baseline differences of ??s (Ptolemy's ?? minus actual ??).

	Edessa	Pella	Veroia	Pydna	Dion	Larissa	Trykki
Edessa		**0,25** ***0,03***	**0,50** ***0,36***	**0,66** ***0,41***	**0,75** ***0,63***	**1,16** ***1,42***	**1,75** ***1,90***
Pella	0,22		**0,25** ***0,25***	**0,41** ***0,38***	**0,50** ***0,60***	**0,91** ***1,39***	**1,50** ***1,87***
Veroia	0,14	0,00		**0,16** ***0,13***	**0,24** ***0,35***	**0,66** ***1,14***	**1,25** ***1,62***
Pydna	0,25	0,03	0,03		**0,09** ***0,22***	**0,50** ***1,01***	**1,09** ***1,49***
Dion	0,12	0,10	0,11	0,13		**0,41** ***0,79***	**1,00** ***1,27***
Larissa	0,26	0,48	0,48	0,51	0,38		**0,59** ***0,48***
Trykki	0,15	0,37	0,37	0,40	0,27	0,11	

Table 2. The matrix of baseline latitude differences (? f) in degrees.
Upper triangular part: Baseline differences in Ptolemy's ?f (bold) and differences in actual ?f (italic).
Lower triangular part: Baseline differences of ?fs (Ptolemy's ?f minus actual ?f).

	Edessa	Pella	Veroia	Pydna	Dion	Larissa
Pella	**0,24**					
Veroia	**0,21**	**0,25**				
Pydna	0,57	0,42	0,67			
Dion	0,83	0,73	0,97	0,34		
Larissa	0,92	0,92	1,14	0,62	0,38	
Trykki	1,06	1,23	1,03	1,62	1,89	1,93

Table 3. The matrix of the ?? and ?f resultants, in degrees, as derived by the lower triangular parts of Tab. 1 and Tab. 2. In bold are resultants ? 15 minutes of arc.

From the above analysis it comes out that only three control points can be used for a positioning of Aegae, namely Edessa, Pella and Veroia, excluding the distant sites of Larissa and Trykki and the closer sites of Pydna and Dion. In Fig. 2 the actual geography of the remaining closest sites to Aegae is shown.

Distance and azimuth analysis

Based on the previous, we concluded that the three control points Edessa – Pella – Veroia, are the only sites closest to Aegae with the less longitude and latitude differences as derived from the comparison of *Geographia's* coordinates with their actual values. For this reason we use these three points in order to estimate the position of Aegae as given by Ptolemy. Using the three control points, the Ptolemy and the actual lengths and azimuths of the three interconnecting baselines are geodetically computed[6] on a unit sphere. In Tab. 4 the *Geographia* and the actual lengths of the baselines are given (upper triangular part) with the magnification coefficients of the Ptolemy lengths with respect to the actual lengths (lower triangular part), as computed on a unit sphere.

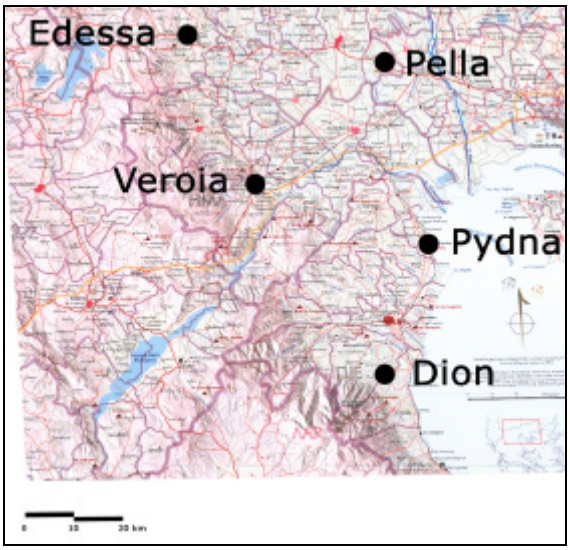

Figure 2. The five control points closest to the city of Aegae as determined in Ptolemy's *Geographia.* Here, the placement of the cities, is according to their actual positioning.

In Tab. 5 the *Geographia* and the actual azimuths of the baselines are given (upper triangular part) and their differences (lower triangular part), as computed on a unit sphere.

	Edessa	Pella	Veroia
Edessa		**0,00891** ***0,00638***	**0,00873** ***0,00522***
Pella	1,40		**0,00894** ***0,00599***
Veroia	1,67	1,49	

Table 4. Upper triangular part: The lengths of the baselines computed on a unit sphere from Ptolemy's coordinates (bold) and from actual data (italic). Lower triangular part: The magnification coefficients of the Ptolemy lengths with respect to the actual lengths.

	Edessa	Pella	Veroia
Edessa		**0,00891** ***0,00638***	**0,00873** ***0,00522***
Pella	1,40		**0,00894** ***0,00599***
Veroia	1,67	1,49	

Table 5. Upper triangular part: The azimuths of the baselines computed on a unit sphere from Ptolemy's coordinates (bold) and from actual data (italic). Lower triangular part: The azimuth differences.

[6] Using the *inverse (or second) geodetic positioning problem* according to which given the longitude and latitude coordinates of two points on the reference surface (ellipsoid or sphere of given dimensions) the surface geodesic line and its azimuths are computed.

From the results of Tab. 4 and Tab. 5 the estimate of the baseline length coefficient *k* and of the azimuth difference ? *a* are given, as

$$\begin{aligned} k &? 1,52 ? 0,14 \\ ? a &? 20,3? ? 4,9? \end{aligned} \quad (1)$$

These two estimates will be used in order to estimate the actual coordinates of Aegae considering its coordinates given in *Geographia.*

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The estimation of Ptolemy's Aegae in actual geography

In order to estimate the position of Aegae in actual geography, the following process is applied: Having Ptolemy's coordinates for Veroia, the closest point to Aegae, and Ptolemy's coordinates for Aegae itself, the length and the azimuth of the Ptolemy baseline Veroia – Aegae, $s_{V?A}$ and $a_{V?A}$, are computed applying the *inverse geodetic problem.* Then the two quantities are reduced to their actual estimates by applying the length coefficient *k* and the azimuth difference ? *a* as found above. We obtain in this way the estimation of the actual distance of Ptolemy's Aegae from Veroia , $S_{V?A}$ and its azimuth $A_{V?A}$. The numerical computations, give the following results on a unit sphere:

$$\begin{aligned} s_{V?A} &? 0,003100 \\ a_{V?A} &? 201,0013? \end{aligned} \quad (2)$$

for the Veroia – Aegae distance and azimuth, and

$$\begin{aligned} S_{V?A} &? \frac{s_{V?A}}{k} ? \frac{s_{V?A}}{k^2} ? 0,14 \\ A_{V?A} &? a_{V?A} ? 20,3? ? 4,9? \end{aligned} \quad (3)$$

for the actual counterparts, from which we obtain the numerical values

$$\begin{aligned} S_{V?A} &? 0,00204 ? 0,00018 \\ A_{V?A} &? 180,75435? ? 4,9? \end{aligned} \quad (4)$$

and for a spherical model earth of 6372 km radius, (4) is written

$$\begin{aligned} S_{V?A} &\square 13km ? 1km \\ A_{V?A} &\square 181? ? 5? \end{aligned} \quad (5)$$

The placement of the above coordinates on the actual map is then shown graphically as in Fig. 3, together with the ca 5 minutes of arc approximation (the grey circle) which is intrinsic in Ptolemy's longitude and latitude determination. We notice that Ptolemy's Aegae determined as above, is situated at the centre of this circular area of uncertainty, in which there are several archaeological. In the same figure, a positioning of Aegae is also given (with the star symbol), derived from a similarity transformation best fitting[7] of the Edessa – Pella – Veroia triangle as defined in *Geographia* onto the actual georeferenced

[7] According to this transformation the shapes are kept unaltered allowing only a global (rigid) rotation and a uniform scale variation.

counterpart (Manoledakis 2005). Following this transformation best fitting, Aegae is defined in the position only few kilometres NW of the position as derived above, almost coinciding with the archaeological site of Lefkopetra.

Concluding remarks

Based on *Geographia* and the coordinates given by Ptolemy in the 2nd century, we attempt to extract some conclusions about the toponyms, both antique and recent (e.g. Edessa, Kopanos – Lefkadia, Valla, Vergina) which have been involved in the discussion concerning the positioning of Aegae. Thus, according to Ptolemy, Aegae should not be placed neither at Edessa nor at the area of Kopanos – Lefkadia since it is positioned much far away in *Geography*. Furthermore, Valla has nothing to do with the archaeological site of Vergina, because its position according to Ptolemy is in another province, in Pieria and to in Emathia. Finally, Vergina is not the place of Ptolemy's Aegae, but it is only few kilometres far from the edge of the uncertainty's circle in Aegae's positioning to the NE direction. In addition, actual Vergina is situated in an area where Ptolemy does not place any city at all. This is not strange because, from all archaeological founding in the Vergina's area, it results that this city was seriously destroyed in the mid 2nd century B.C., while it seems that it was definitively abandoned before the 1st century A.D. that is before Ptolemy's era (Drougou 2002-2003: 155; Kottaridou 1987: 109 f.; Saatsoglou-Paliadeli 1996: 60; 2002: 479; Faklaris 1996: 71 f.; Saatsoglou-Paliadeli 2001: 211, n. 85). It is worth recalling here that Ptolemy lists in *Geography* all important inhabited cities of his period, known to him. (?.19.2).

Figure 3. The positioning of Aegae (dark grey spot), as derived in this study, according to Ptolemy, on an actual map of the area, within a 10 km radius circle of uncertainty (light grey circle). An alternative positioning of Aegae (dark grey star) is according to a similarity best fitting of Ptolemy's triangle Edessa – Pella – Veroia into its actual georeferenced counterpart.

On the other hand, the archaeological excavations and the relevant research in the wider area of Lefkopetra (Stefani 2001: 559-570; 2002a: 545-552; 2002b: 531-539) have not offered any indication about the existence of a capital city and later of a royal necropolis. For the surrounding regions see Kottaridi and Brekoulaki 1997: 109-112; Kottaridi 2001: 501-507. On the contrary the interpretation of the archi-

tectural remains and the excavation founding in the Vergina area, in combination with some information given by the historical sources, plead for the theory that this was the site of Aegae. But, despite this theory, we know that Aegae existed also after the 1st century A.D. as it is stated by Ptolemy but also due to epigraphic inscriptions from the 3rd century A.D. What happened then?

In discussing this, we have to notice that Ptolemy's coordinates are given with an intrinsic approximation of five spherical minutes of arc which means something like 10 kilometres approximation on an actual terrestrial sphere, as it is seen in Fig. 3. In this uncertainty zone, the terrain relief of the steep mountainous areas in the west and SW directions and the location of Veroia at the North, promote the conclusion due to which, after the abandoning of Aegae at the site of Vergina, its inhabitants or a part of them, moved to W – SW, maybe close to the river Aliakmon, and founded there a new city, the position of which, even still unidentified by the implacable archaeological evidence, is located by Ptolemy in the area shown in Fig. 3. This does not exclude, of course, that relevant move of the original city of Aegae population to other directions and locations. In any case, it looks that Ptolemy's *Geography* in combination with archaeological and other geographic evidence, supports the theory that the city of Aegae was first built at Vergina and definitively not at Edessa or in the area of Naoussa. The ascertainment or the disproof of Ptolemy's records is a question to be answered by the archaeological excavation and the associated research.

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