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Iterative Reconstruction of Ptolemy's West Africa Using Modern GIS Analysis

Keywords: Claudius Ptolemy, ancient geography, GIS analysis, historical cartography, georeferencing

Summary: The multifaceted and challenging problem of reconstructing Claudius Ptolemy's map of ancient West Africa from the numeric coordinate data and other information found in his seminal 'Geography' and visualizing the results in modern projections using popular and powerful GIS tools, such as ArcGIS and Google Earth, is addressed by the authors iteratively. We apply a combination of several old and new techniques ranging from traditional toponymic analysis to novel modifications of cluster analysis. Our hybrid human-machine method demonstrates that Ptolemy's information on West Africa is a compilation of data from three or more sources, including at least one version or derivative of The Periplus of Hanno. The newest iteration adds data for three more provinces of Ptolemy's Libya — Mauretania Caesariensis, Africa and Aethiopia Interior— to Mauretania Tingitana and Libya Interior investigated in an earlier, unpublished version of the work that the late Lyudmila Filatova had contributed to as the founder of our multi-year project. The surviving co-authors used their newest digital analysis methods (triangulation and flocking with Bayesian correction) and took into account their recent finds on Ptolemy's Sinae (Guinea/Senegal, where Ptolemy had placed fish-eating Aethiopians). We discuss some of the weaknesses and fallacies of the earlier approaches to the problem. Our revised digital reconstruction will help modern history of cartography researchers and the general public improve their understanding of what West Africa was like in the distant past.

Introduction

Claudius Ptolemy was a prominent pioneer of scientific approach to astronomy and geography, two disciplines that he helped lay the early foundations of. It is believed that he lived in Alexandria, Egypt, in the 2nd century AD. For his achievements, Ptolemy is recognized as the greatest African scholar of all time. Naturally, there have been several attempts at the reconstruction of ancient West Africa based on the data from his seminal *Geography* (Stückelberger & Grasshoff, 2006), given that the monograph provided a set of coordinates (latitudes and longitudes) of 6300+ ancient objects — cities, villages, markets, temples, altars, harbors, mountains, capes, bays, lakes, river sources, turns, splitting points, junctions and mouths, forests, etc. — and 500+ of these objects could be localized in five provinces (regions) of West Africa, namely: Mauretania Tingitana, Mauretania Caesariensis, Africa, Libya Interior, and Aethiopia Interior. In particular, conventional linguistic and toponymic analysis of Ptolemaic maps was applied to this problem as part of a larger

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task of reconstructing all of Ptolemy's Africa (Lacroix 1998). The fruit of a major effort to reconstruct a considerable part of the region within the framework of a larger project is found in (Talbert 2000). The latter source notably disagrees with Lacroix on identification of the ancient *Darat*, or *Daratis* river (Ptolemy's *Daradus*) and takes it to be the modern Draa river. Lacroix believed that the *Daradus* river corresponded to the modern Senegal river. The distance between the mouths of the Senegal river and the Draa river exceeds 1,400 kilometers, and their respective sources are spaced more than 2,400 kilometers apart. The disagreement would be of purely academic interest if Ptolemy had not placed five or six cities in the vicinity of his *Daradus* river. We accept that *Daradus* corresponds to Draa and propose identifications of the cities accordingly. One natural objection to our decision would stem from the fact that Pliny the Elder mentioned that there were crocodiles in *Daratis* (Pliny 1855). However, it was claimed that a relic population of crocodiles did live in the valley of Draa until the early twentieth century (Smet 1998). The mouth of the *Darodus* river is shown in the vicinity of Draa's delta on (Bellin 1738). It was difficult for us to ascertain which of the mouths of Draa's sprawling delta once corresponded to Ptolemy's *Daradus*. In fact, the mouth currently considered to be the main one of Draa used to be called "Wady Nun" in the recent past, and the modern Cap Draa used to be called "Cap Noun." The name Noun (Nun) is similar to the names of two other nearby rivers of Libya Interior mentioned by Ptolemy — *Nuius* and *Nias*. Based on the map evidence, such as (Radefeld 1844), we conclude that the mouth of *Daradus* corresponds to Boca Grande, the mouth of Oued Chebika, former Wady Draa. We have discussed this sample identification here in order to introduce the reader to some of the challenges encountered when dealing with the wider problem at hand. Livieratos (2006) emphasized the need for "a rigorous revisiting of Ptolemy's representations, especially the regional tabulae, in terms of georeferencing."

This paper presents a thorough revision of an earlier, unpublished version of the work that the late Lyudmila Filatova had contributed to as the founder of our multi-year project. The newest iteration adds data for three more provinces of Ptolemy's Libya — Mauretania Caesariensis, Africa and Aethiopia Interior — to Mauretania Tingitana and Libya Interior previously investigated. We show that there is more to gain by working with the coordinate data directly, as opposed to just visually comparing old and modern maps in search of similar toponyms. Indeed, the many known objects mentioned by Ptolemy can serve as reference points that can help us place and identify previously unknown objects. We can also utilize object descriptions that Ptolemy provided, along with names of the tribes that once populated *oikouménē*, the 'known world' of the ancients. Numerous source distortions and errors of data compilation, along with other mistakes, require additional georeferencing of Ptolemy's coordinates to map the ancient objects correctly in a modern projection for visualization in a popular GIS tool, such as ArcGIS and Google Earth. Even the discrepancies between different editions of Ptolemy's *Geography* amount to a contributing noise factor (Dilke 1987), which is hard to quantify in relation to Ptolemy's own errors. Our prior publications dealt with Ptolemy's Taprobane and India before the Ganges (Abshire et al. 2016, 13–34), Arabia (Abshire et al. 2016, 133–154), the Fertile Crescent including Judaea Palestina, Syria, Mesopotamia, and Babylonia (Abshire et al. 2017, 152–167), Britain and Ireland (Abshire et al. 2017) and, most

recently, India beyond the Ganges, Serike and Sinae (Gusev and Stafeyev 2018). In the latter work, we proposed and advocated a novel hypothesis placing Ptolemy's Sinae almost entirely in West Africa, along with several objects from India beyond the Ganges. This result justified the need to revise and expand our early, unpublished work on Ptolemy's West Africa. A review of other scientific literature relevant to the GIS analysis of Ptolemy's data on West Africa is supplied in the next section of the paper.

The third section of the paper will describe our main methodology. The surviving co-authors applied their newest digital analysis methods — triangulation and flocking with Bayesian correction. In addition to these methods, a combination of several techniques ranging from traditional toponymic analysis to novel modifications of cluster analysis will be used. The fourth section of the paper will concentrate on classification of Ptolemy's objects by cluster analysis. We will divide Ptolemy's objects into groups whose areas are allowed to intersect in his coordinate system, and those groups will be treated differently, according to the properties of the region's data.

Our integrated reconstruction map of Ptolemy's West Africa is presented in the fifth section of the paper, along with a couple of interesting identifications. We will use the point classification introduced in our paper on Ptolemy's Arabia (Abshire et al. 2016, 133–154) and divide all Ptolemy points into four categories: *known* points, *tentatively identified* points, *unknown* points (placed approximately), and *duplicates*. In the final section of the paper, we will draw conclusions and share our plans for the future research.

Literature Review

The best available complete translation of Ptolemy's *Geography* into a modern European language is the German translation by Stückelberger and Grasshoff (2006). It includes an authoritative Greek version of the original monograph printed side-by-side with its translation. The book is accompanied by an electronic database of coordinates, complete with an intuitive object ID system. In our work, we have utilized the database and adopted the ID system. Stückelberger and Grasshoff often suggest modern names for the Ptolemy objects. For example, they propose the modern Moroccan town of Asilah as the counterpart of Ptolemy's *Zilia colonia* in Mauretania Tingitana. However, as Abshire et al. (2017) pointed out, French archaeologists had found altars with inscriptions that let them identify the ruins at Dchar Jdid located 12 km away from Asilah as *Iulia Constantia Zilil* (Lenoir 2005). That archaeological site was previously thought to be Ad Mercurio.

The only complete English translation of Ptolemy's *Geography* (Ptolemy 1991) is of poor quality (Diller 1935). Nevertheless, we have used this source to come up with suitable English counterparts for the German object names. This process involved some latinisation to undo Ptolemy's "interpretatio graeca" of Latin names in the area. Besides, Stückelberger and Grasshoff took the liberty of substituting many modern accepted names for their ostensible counterparts in Ptolemy's manuscript, so we felt compelled to undo those changes. Very many toponyms in West Africa are of

Berber (Tamazight) origin, and a few more are Phoenician (Punic), so, admittedly, no name assignment is perfect. Berggren and Jones (2000) produced an annotated English translation of the theoretical chapters of *Geography*, and Diller (2009) translated Ptolemy's Book 8. The classical Latin translation of *Geography* by Müller (1883-1901) contains many insightful comments and provides thorough lists of different spellings of Ptolemy's object names.

The modern online atlas by Åhlfeldt (2017) was of great help to us at the first step of identification of the known points. Yet, no source is perfect. In particular, *Aquae Aptuccensium* in Africa (Ptolemy's *Aquae Calidae*, also known as *Aquae Calidae Cirnensis*) turned out to be misplaced by 45 kilometers south, away from the nearby *Aptucca*, which we identified as Ptolemy's *Aspucca*. Likewise, the position of the ruins of *Thagari*, which we identified as Ptolemy's *Targarum*, was misplaced by almost 6 kilometers to the east. We rectified both errors using the specialized and highly detailed *Atlas archéologique de la Tunisie* (Babelon et al. 1893). Tsorlini (2011) produced a high-quality catalog that covers Ptolemy's Mediterranean and Black Sea region thoroughly and comes with an original methodology for derivation of modern coordinates.

Regression analysis (Draper and Smith 1998) is a popular mathematical technique that has been applied to old maps since (Tobler 1966), where equations were derived to relate the medieval Hereford map to an oblique Mercator projection. In the next section, we will apply a simple two-dimensional regression as part of the first step of our iterative procedure. Many references to other works related to the numerical analysis of ancient maps are provided in the literature reviews included in our earlier papers referenced in the introduction.

Methodology

First of all, we need reference points to place the rest of the objects approximately, so the necessary first step is to identify and georeference as many locations as possible. The second step of the process is to place the objects that could not be directly identified and georeferenced. The third step involves tentative or certain identification of some of the objects that were placed approximately on the previous step. If the number of objects identified with certainty increases, then the second step may be revisited, provided that we still have objects to be place approximately.

Traditional Ptolemaic maps show the western coastline of Africa going south and then taking a turn to the west. In order to solve this problem for the purposes of subsequent iterative analysis, we initially selected 25 reference points located in Morocco and built a simple two-dimensional regression that yielded two equations,

$$\lambda_{\text{Modern}} = a_0 + a_1 \cdot \lambda_{\text{Ptolemy}} + a_2 \cdot \varphi_{\text{Ptolemy}}. \quad (1)$$

$$\varphi_{\text{Modern}} = b_0 + b_1 \cdot \lambda_{\text{Ptolemy}} + b_2 \cdot \varphi_{\text{Ptolemy}}, \quad (2)$$

where a_0, a_1, a_2, b_0, b_1, and b_2 are the regression coefficients, λ_{Modern} and λ_{Ptolemy} are longitudes in the coordinate systems denoted by the subscripts, and φ_{Modern} and φ_{Ptolemy} are the corresponding latitudes. Equations (1) and (2) were used to calculate the approximate modern coordinates of the

points located in Morocco and further south from it, along with those of some of the known points in Algeria and Tunisia. The model's linearity guaranteed that it was relatively safe to extrapolate with. Once the results were plotted in a GIS, distortions became apparent, especially when viewed in the GIS. Our map for initial analysis is shown in Figure 1. This map is included in the paper to illustrate how our methodology evolved, and not for the final results presentation. In the map, the reference points are green, the known points that were intentionally skipped and not used as reference points are light green, and the points derived from the model are red. To get a better visual impression of how much distortion is due to extrapolation, note that Ptolemy's *Tucca* and *Capsa* correspond to the well-known Dougga and Gafsa, both in the modern Tunisia. In the meanwhile, the model placed six *Beatorum islands* between Canary Islands and Cape Verde. Pliny the Elder tells us that one of those islands, *Ninguaria* (Ptolemy's *Pintuaria*), is covered with snow (Pliny 1855). Hence, *Pintuaria* is identified as Tenerife, where snow can be seen on Pico de Teide, and the island located next to it, *Canaria*, is identified as Gran Canaria (Lacroix 1998, Talbert 2000). Pico de Teide seemingly marks Ptolemy's prime meridian, as his longitude of *Pintuaria* is equal to 0 degrees. As no mountains could be found near the location where Ptolemy's *Solis mountains* were placed, we found it useful to search for this mysterious object. The search led us to a classification of points described in the next section.

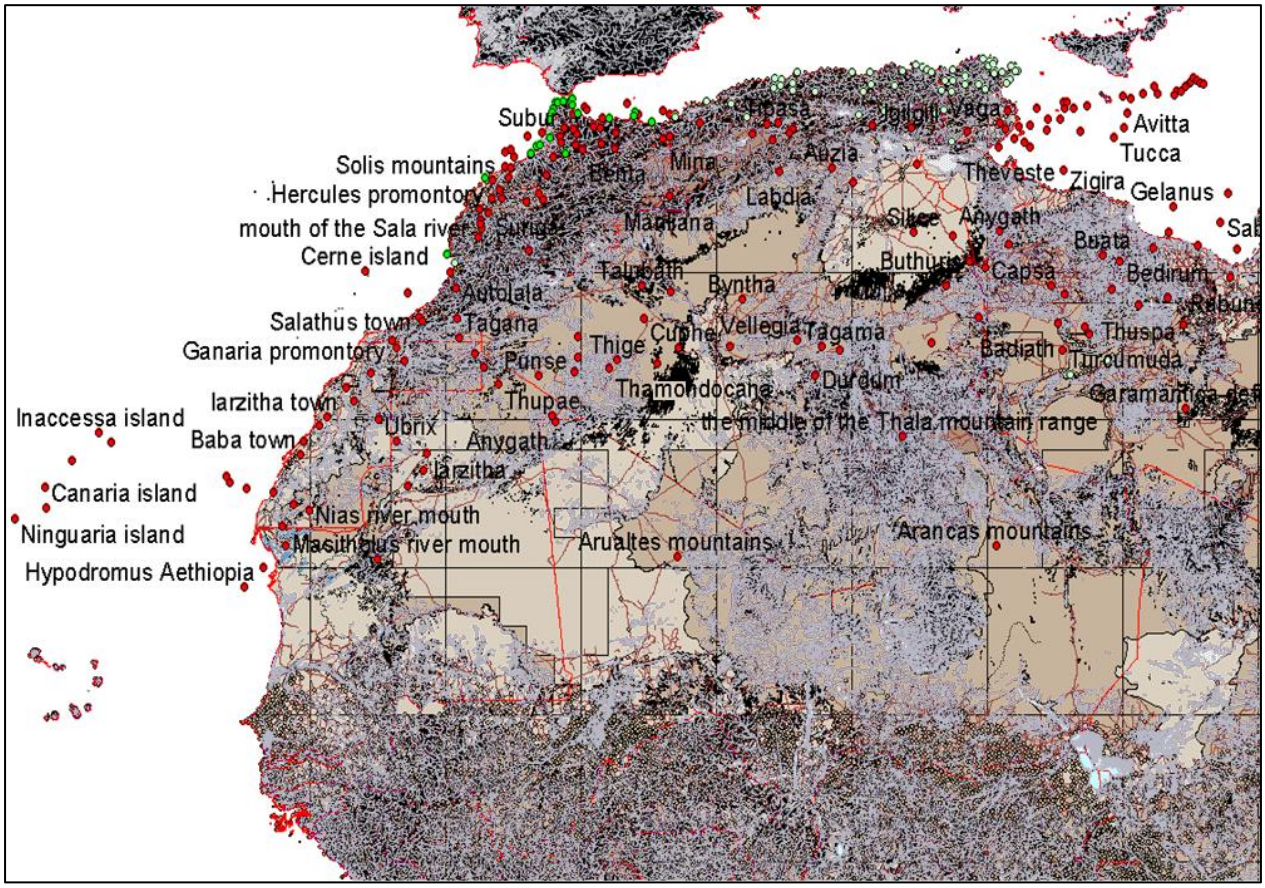

Figure 1: Map for initial analysis.

Meanwhile, we came up with an alternative technique for approximate object placement. Even though the Earth is not exactly spherical, the problem of approximate localization of Ptolemy's points can be interpreted as that of scattered data fitting on a sphere. Our technique is illustrated in Figure 2.

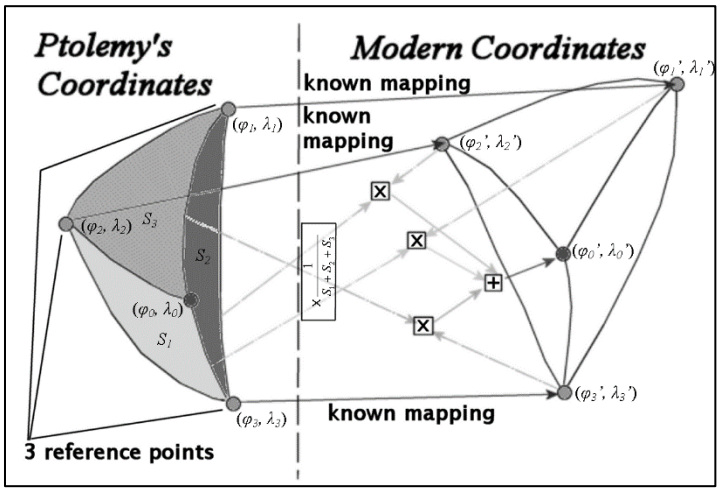

Figure 2: Approximate localization by local interpolation on a sphere

Whenever Ptolemy's unknown point lies inside a spherical triangle formed by three known reference points, its location on the modern map can be approximated as follows. The modern coordinates of each reference point are weighed by a coefficient defined as the ratio of the area of a triangle formed in Ptolemy's coordinate system by the other three points to the area of the triangle formed in Ptolemy's coordinate system by the three reference points themselves. The approximate modern coordinates of the inside point are then computed by summing up the products,

$$\varphi_0' = \sum_{i=1}^{3} \frac{\varphi_i' \cdot S_i}{S_1 + S_2 + S_3}, \tag{3}$$

$$\lambda_0' = \sum_{i=1}^{3} \frac{\lambda_i' \cdot S_i}{S_1 + S_2 + S_3}, \tag{4}$$

where φ_0' is the approximate modern latitude of the inside point, λ_0' is its approximate modern longitude, φ_i' and λ_i', i=1,2,3, are the modern latitudes and longitudes of the three reference points, and S_i, i=1,2,3, are areas of the corresponding spherical triangles shown in Figure 2.

In our computation of the areas of spherical triangles in Ptolemy's coordinate systems, we applied a special *narrowing coefficient* γ to the longitudinal differences in order to account for Ptolemy's underestimation of the length of equator. Berggren and Jones (2000) pointed out that Ptolemy's estimate of the length of equator is about 18 percent too small, so, as far as the longitudes are concerned, "his equivalent for one degree in stades is only about 82 percent of what it should be." We determined that Ptolemy's underestimation is unevenly distributed. That is to say, the local value of the narrowing coefficient should be between 0.85 and 0.95 in Asia Minor, yet it is approximately 0.73 in Morocco. The area of a spherical triangle can be computed as

$$S = 4 \cdot \arctan \sqrt{\tan\left(\frac{s}{2}\right) \cdot \tan\left(\frac{s-a}{2}\right) \cdot \tan\left(\frac{s-b}{2}\right) \cdot \tan\left(\frac{s-c}{2}\right)}, \tag{5}$$

where *a*, *b*, and *c* are the lengths of its sides in radians, and *s=(a+b+c)/2*. Each of the lengths of the sides of a spherical triangle was computed as a *modified great circle distance*

$$d_{1,2} = 2 \cdot \arcsin\left[\min\left\{1, \sqrt{\left(\sin\frac{|\varphi_1 - \varphi_2|}{2}\right)^2 + \cos\varphi_1 \cdot \cos\varphi_2 \cdot \left(\sin\frac{\gamma\,|\lambda_1 - \lambda_2|}{2}\right)^2}\right\}\right], \tag{6}$$

where φ_1 and φ_2 are the latitudes of two vertices of the triangle, λ_1 and λ_2 are the corresponding longitudes, and γ is the narrowing coefficient. Both latitudes and longitudes are expressed in radians. The ordinary *great circle distance* can be computed using Equation (6) by setting γ=1. There seems to be no need to modify the latitude differences. For example, the latitudinal narrowing coefficient computed for the pair *(Byzantium, Tonice)*, i.e. *(Istanbul, Tanga)*, is equal to (41.0333+5.0667)/(43.0833+4.25) = 0.9739. This value is sufficiently close to 1.

Abshire et al. (2016, 13–34) addressed the challenge of how to assign the set of unknown points to the sets of points representing their respective surrounding spherical triangles. A Delaunay (1934) triangulation of the known points in their ancient coordinates was computed, and the surrounding point triangles were looked up for a point to be predicted. In the same publication, Abshire et al. introduced and described a technique capable of handling prediction for points that were not surrounded by a spherical triangle of known points — flocking with Bayesian correction. This second technique was further refined by Abshire et al. (2016, 133–154) to ensure that the unknown point "tracked" its closer known neighbors during flocking to a greater extent than the ones that are situated relatively far away from it.

Classification of Ptolemy's Objects by Cluster Analysis

Having compared statements by Herodotus (Marincola and A. de Sélincourt 1996), The Periplus of Hanno (Schoff 1972), and Pliny the Elder, we concluded that the objects named *Solis mountains* and *Soloentia promontory* by Ptolemy are, in fact, two duplicates of his *Cotes promontory* (this name is apparently related to Pliny's *Cotte* and Hanno's *Gytta*), now Cap Spartel. We preliminarily assigned the likely duplicates to three groups dubbed "Group Cotes", "Group Solis", and "Group Soloentia". For the suspected pairs of duplicates, we then plotted the differences of Ptolemy's latitudes for cluster analysis as shown in Figure 3. The latitudes are of interest, as the shoreline of West Africa is oriented roughly north-south. The points in Fig. 3 formed four clusters, with one remarkable "special case" at (13,4). Let's briefly discuss this special case. The y-coordinate value of the point that represents the special case (4 Ptolemy's degrees) is the latitudinal difference between mouths of two rivers, *Stachir* and *Daradus*. We noticed that Ptolemy's description of *Stachir* matches Hanno's description of a river named *Chretes*. Indeed, Ptolemy speaks of the "Rysadius mountains, in which the Stachir river takes its rise flowing through the Caeonia lake not far from the mountains and the Nias river." Hanno (1972) says, "Thence, sailing by a great river whose name was Chretes, we came to a lake, which had three islands, larger than Cerne. Running a day's sail beyond these, we came to the end of the lake, above which rose great mountains…" The name

Caeonia in Ptolemy's description may be a variation of *Cerne*, and the name *Stachir* appears to be a corruption (near inversion) of *Chretes*, which looks like a modification of *Daradus*.

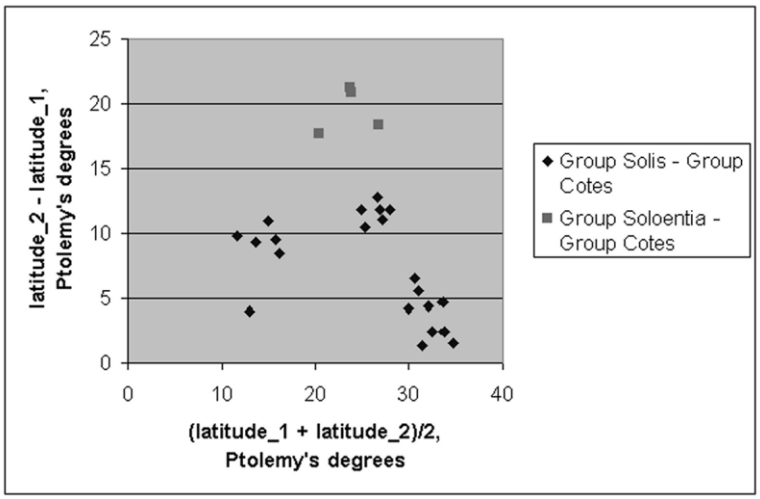

Figure 3: Differences of Ptolemy's latitudes plotted for pairs of suspected duplicates.

In addition to helping us identify the objects and determine if any of them are duplicates, our hybrid human-machine method demonstrated that Ptolemy's information on West Africa is a compilation of data from three or more sources, including at least one version or derivative of The Periplus of Hanno. A complete table of known and likely duplicates is found in Appendix A at the end.

The Reconstruction Map

Figures 4-8 provide a visual representation of the results that we have achieved for Ptolemy's West Africa. ESRI's ArcGIS was used to make the maps. Due to the size limitation imposed on this paper, we cannot possibly discuss all object identifications. The tables of modern coordinates for known and tentatively identified locations in Ptolemy's West Africa can be found in Appendix B at the end of the article. The tentative identifications are accompanied by question marks.

We will briefly comment on our tentative identification of the mouth of Ptolemy's *Kinyps* river that is commonly taken to be the mouth of Wadi Caam, also called Wādī Ki'ām, near *Leptis Magna*. We find it far from certain that the small Hellenic necropolis discovered there had anything to do with the legendary Dorieus, a Spartan prince, who once settled by *Kinyps*, but was driven out by the locals after three years, according to Herodotus. Instead, we discard Ptolemy's placement of the river's mouth as erroneous and take his *Gerisa* (the modern Ghirzah) to be the location of the Hill of the Graces, or Charites, 200 stades (~37 kilometers) away for the sea, where *Kinyps* flows from, according to Herodotus. The distance does not match exactly, but neither does the length of Wadi Caam. Consequently, we favor Wadi Zamzam near *Gerisa* over Wadi Caam. The name of the former is of Arabic (later) origin, and Wādī Kanāfis is found among Wadi Zamzam's tributaries. Our decision allowed us to trace approximately the three Ptolemaic sources of *Kinyps*.

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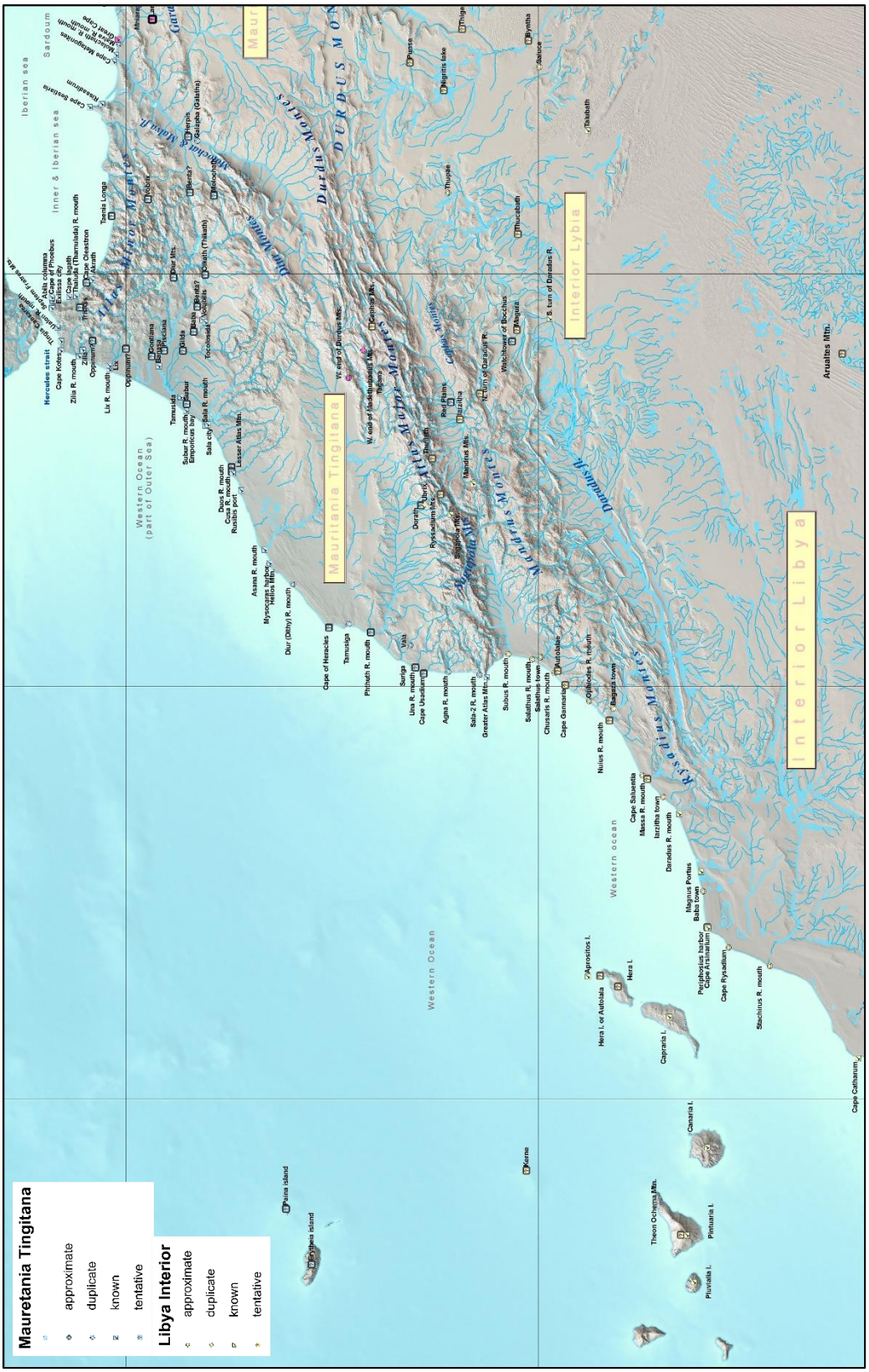

Figure 4: Ptolemy's Mauretania Tingitana.

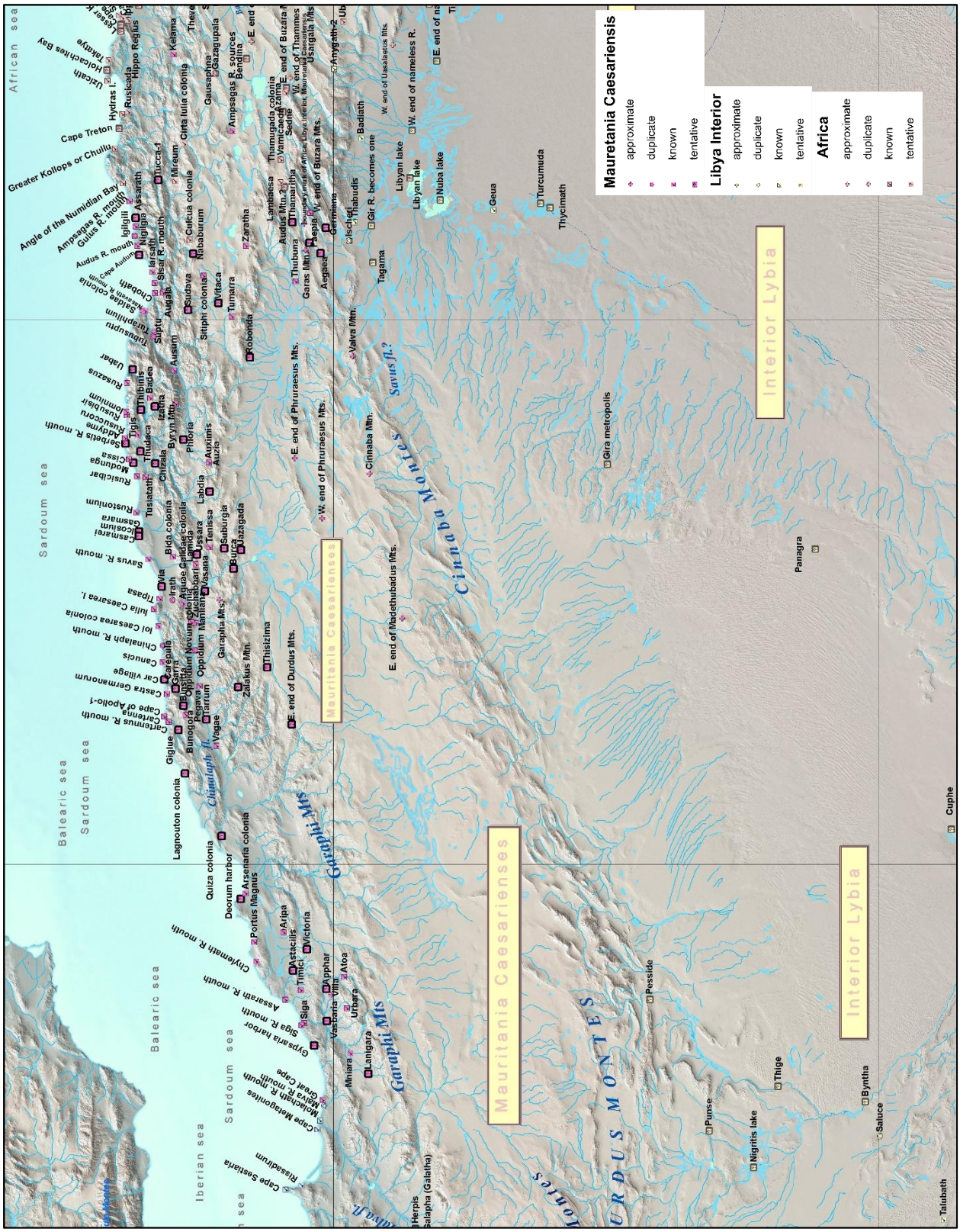

Figure 5: Ptolemy’s Mauretania Caesariensis.

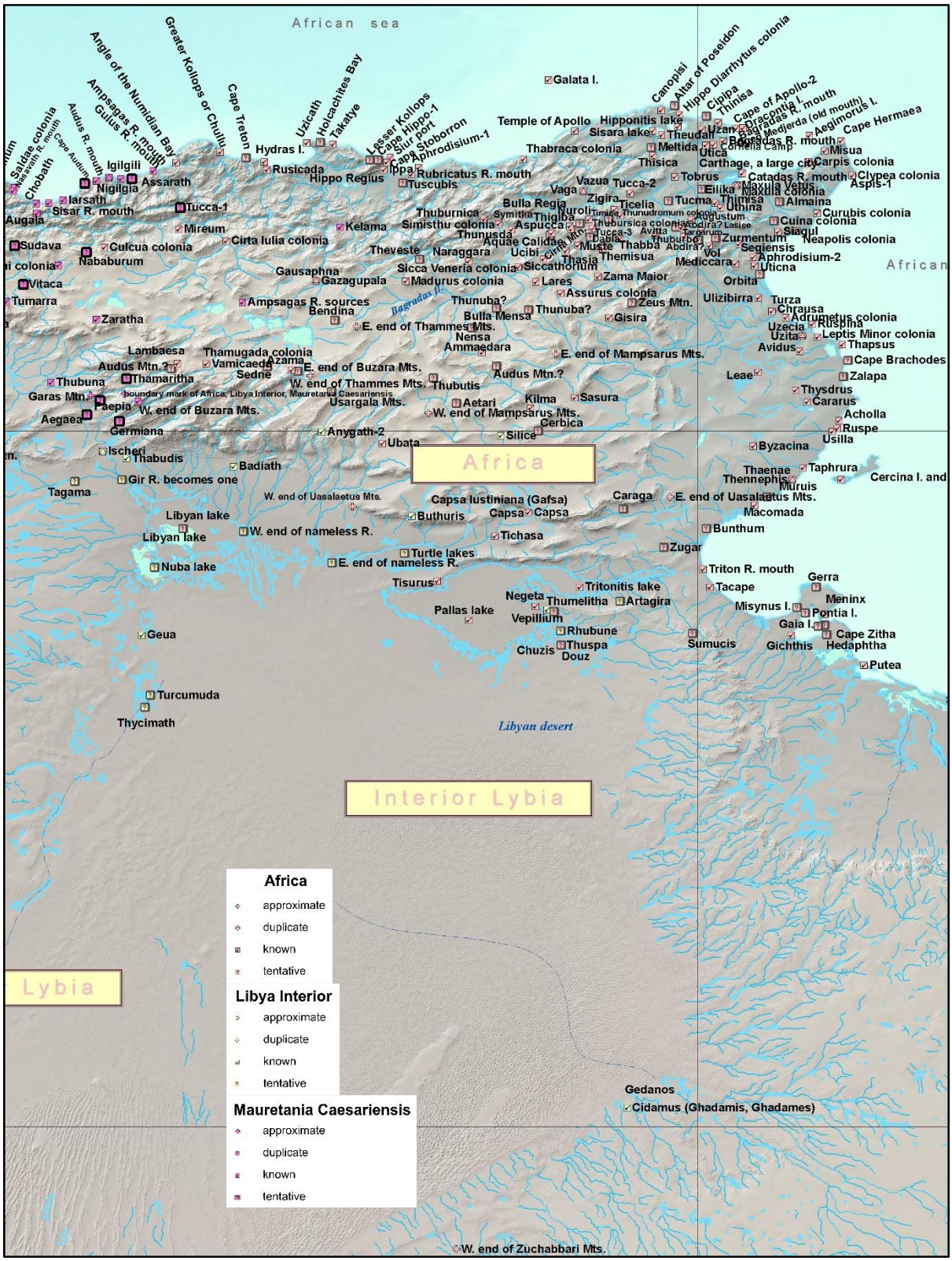

Figure 6: Ptolemy's Africa province.

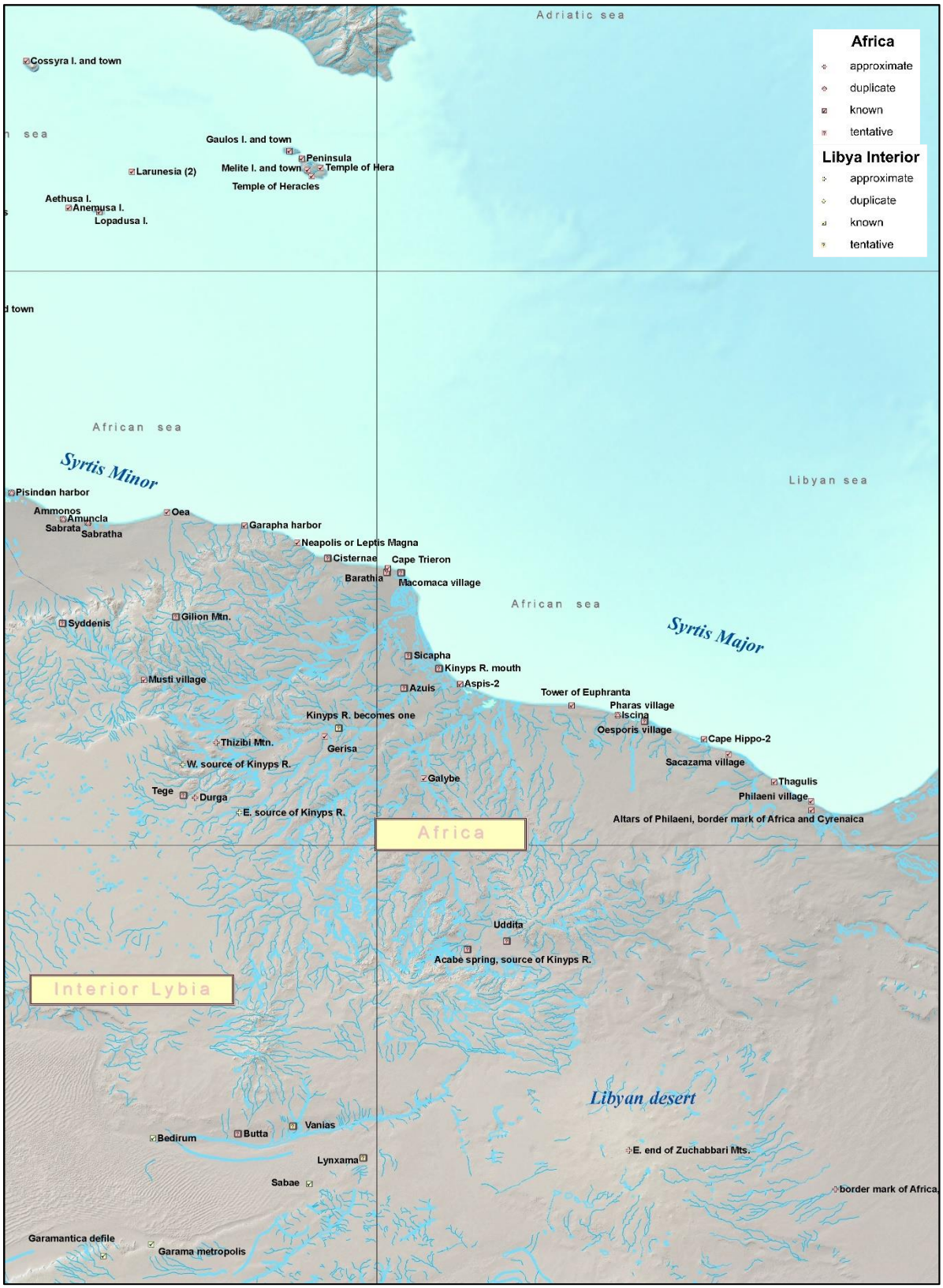

Figure 7: Ptolemy's Tripolitania.

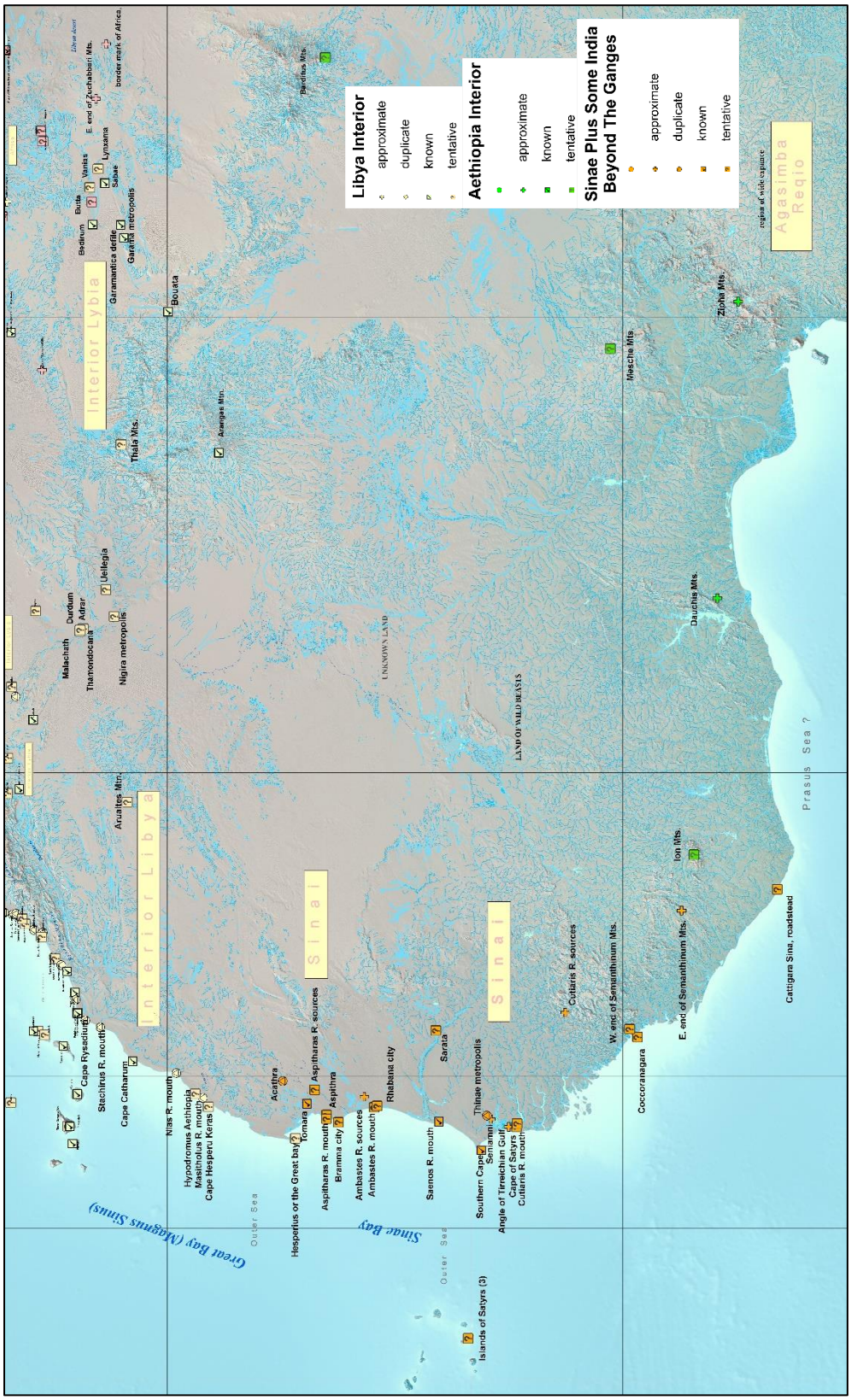

Figure 8: Ptolemy's Libya Interior, Aethiopia Interior and Sinae.

Conclusions and Future Work

We reconstructed Ptolemy's map of ancient West Africa. Our reconstruction improves understanding of what West Africa was like in the distant past, in terms of development of civilization there and the contemporary geographic knowledge of it. Further improvement can be achieved by means of additional research and linguistic analysis of old maps and other historical documentary evidence, archaeological work, or via analysis of aerial and satellite photographs of the potential locations of lost ancient cities.

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Appendix A. Table of Known and Likely Duplicates

Table 1. Known and likely duplicates in Ptolemy's West Africa.

Ptolemy ID 1	*Ptolemy Name 1*	*Ptolemy ID 2*	*Ptolemy Name 2*	*Modern Name(s)*
4.01.03.02	Diur (Dithy) R. mouth	4.01.02.07	Duos R. mouth	Sidi Moussa? / Oued Dir
4.01.03.03	Helios (Solis) Mtn.	4.01.02.11	Cape Kotes	Cap de Mazagan? / Cap Spartel
4.01.04.01	Tamusiga	4.01.13.07	Tamusida	Safi? / Thamusida (Sidi Ali ben Ahmed)
4.01.04.05	Agna R. mouth	4.01.03.01	Asana R. mouth	Oued Iguezoullene? / Oued Oum er Rbia, near Azemmour
4.01.04.06	Sala-2 R. mouth	4.01.02.05	Sala R. mouth	Assif Ait Ameur? / Wadi Sala (Oued Bou Regreg)
4.01.07.06	Malva R. mouth	4.01.07.05	Molachath R. mouth	Oued Moulouya
4.01.15.01	Galapha (Galatha)	4.01.14.08	Molochath	Al Khelafiyine? / Maghraoua, El Malaïch, Tmourghout?
4.01.15.05	Vala	4.01.02.06	Sala city	Aït Mbarek Ou Bella? / Chellah, ruins near Salé
4.02.04.04	Car (Iar) village	4.02.04.03	Carepula	Damous?
4.02.05.02	Chinalaph R. mouth	4.02.03.01	Chylemath R. mouth	Oued Messelmoun? / Oued Chelif (Chlef)
4.02.23.03	Arina	4.02.23.04	Aripa	Arbal
4.02.25.06	Irath	4.02.28.07	Izatha	Meurad? / Larbaâ Nath Irathen?
4.02.26.03	Casmarei	4.02.28.03	Gasmara	Bouzaréah?
4.02.26.06	Nigilgia	4.02.11.03	Igilgili	Jijel
4.02.27.02	Oppidium	4.02.25.01	Oppidum Novum colonia	Aïn Defla (former Duperre)
4.02.28.05	Symitha	4.03.29.05	Simisthu colonia	Simitthus (Chemtou)
4.02.28.08	Auximis	4.02.31.05	Auzia	Aumale, Sour el Ghozlane
4.02.33.02	Suptu	4.02.31.06	Tubusuptu	Tubusuctu (Tiklat, near El-Ksour)
4.02.33.03	Ippa	4.03.05.04	Hippo Regius	Hippo Regius, ruins near Annaba
4.02.33.04	Vamicaeda	4.03.30.12	Thamugada colonia	Timgad, Thamugas, Thamugadi
4.02.34.07	Taruda	4.06.29.05	Thabudis	Thabudeos, Tabudium Oppidum (Tehouda)
4.03.07.06	Clypea colonia	4.03.08.02	Aspis-1	Kélibia (Qulaybiyah)
4.03.30.13	Gazagupala	4.03.29.11	Gausaphna	Gadiaufala, Gazophyla (Ksar-Sbahi/Sbehi)
4.03.32.06	Vazua	4.03.28.06	Vaga	Béja
4.03.32.07	Nensa	4.03.35.04	Bulla Mensa	Bulla Mesa (Table de Jugurtha, near Kalaat es Senam)?
4.03.34.04	Maxula Vetus	4.03.07.03	Maxula colonia	Radès
4.03.37.04	Chrausa	4.03.37.05	Turza	Gurza (Kalaa Kebira)
4.03.39.02	Uzecia	4.03.37.08	Uzita	Henchir-Makrceba (Henchir Makhreba)
4.03.39.10	Thennephis	4.03.11.02	Thaenae	Thaenae (Thyna)
4.03.41.04	Pisinda	4.03.12.04	Pisindon harbor	Pisida (near Abu Kammash, Bu Chemmasc)

4.03.41.05	Sabrata	4.03.12.03	Sabratha	Sabratah
4.03.41.09	Iscina	4.03.14.06	Pharas village	Charax (As Sultan, Medina Sultan, near Surt)
4.03.42.02	Amuncla	4.03.42.01	Ammonos	Ad Ammonem (Mellita)
4.03.44.07	Anemusa I.	4.03.44.09	Aethusa I.	Lampione Island
4.06.05.02	Subus R. mouth	4.01.02.03	Subur R. mouth	Oued Sous? / Oued Sebou
4.06.05.03	Salathus R. mouth	4.01.02.05	Sala R. mouth	Oued Massa? / Wadi Sala (Oued Bou Regreg)
4.06.05.04	Salathus town	4.01.02.06	Sala city	Tassila? / Chellah, ruins near Salé
4.06.05.05	Chusaris R. mouth	4.01.02.09	Cusa R. mouth	Oued Assa, Talat Ou Haiss? / Oued Mellah, its tributary: Oued el Hasser (Oued Haçar)
4.06.05.07	Ophiodes R. mouth	4.01.03.05	Phthuth R. mouth	Uad Sidi Ifni? / Oued Tensift?
4.06.06.01	Bagaza town	4.01.03.04	Mysocaras harbor	Assaka? / El Jadida (former Mazagan)
4.06.06.03	Cape Saluentia	4.01.02.11	Cape Kotes	Cap Drâa (former Cap Noun)? / Cap Spartel
4.06.06.05	Iarzitha town	4.06.24.06	Iarzitha	El Ouatia (Tan-Tan Plage)? / ruins near Ouarzazate
4.06.06.08	Baba town (Babiba)	4.01.14.01	Baba	Baballaca (Ajfenir Point?) / Iulia Campestris Babba, Baba (Bab Tisra, Bab Tissera?)
4.06.06.10	Cape Rysadium	4.01.04.07	Greater Atlas Mtn.	Pointe Stafford? / Cap Rhir, Cap Ghir
4.06.07.02	Stachirus R. mouth	4.06.06.06	Daradus R. mouth	Wad as Saquia al Hamra? / Oued Chebeika, Boca Grande (former Wady Draa)
4.06.07.05	Nias R. mouth	4.06.06.02	Nuius R. mouth	Uad Kraa? / Oued Noun, Oued Assaka
4.06.07.07	Masitholus R. mouth	4.06.06.04	Massa R. mouth	Rio del Oro? / Oued Drâa (former Wady Nun)
4.06.14.09	Libyan lake	4.03.19.04	Libyan lake	Chott Melhrir
4.06.28.01	Thupae	4.06.32.06	Thuspa	Merzouga, near Erg Chebbi? / Douz?
		ID-3:4.03.41.02	Name-3: Chuzis	
4.06.28.03	Saluce	4.06.27.01	Pesside	Zerhamra? / Zenaga, in Figuig (Tazdayt)?
4.06.29.06	Siccathorium	4.03.30.05	Sicca Veneria colonia	El Kef
4.06.29.07	Capsa	4.03.39.08	Capsa	Capsa Iustiniana (Gafsa)
4.06.32.04	Ischeri	4.02.34.05	Vescethra	Vescera (Biskra)
7.02.24.04	Tamara (Tomara)	7.02.03.07	Tamala	Tamarâṭ / Thama
7.03.05.02	Akathra (Akadra)	7.02.06.06	Akadra	Agâda / Chanthaburi (9 c. Kadranj)
7.03.05.03	Aspithra	6.16.07.02	Aspakara	Et Tîdra (Tidra)?
7.03.06.01	Thinae metropolis	6.16.08.07	Sera metropolis	Diakhao, Kingdom of Sine capital, on Sine R./ Xi'an

Appendix B. Tables of Known and Tentatively Identified Objects

Table 2. Known and tentative locations in Mauretania Tingitana.

Ptolemy ID	*Ptolemy Name*	*Modern Name*	*Ptol. Lat.*	*Ptol. Lon.*	*Mod. Lat.*	*Mod. Lon.*
4.01.02.11	Cape Kotes	Cap Spartel	35.92	6.00	35.7920	-5.9248
4.01.02.01	Zilia R. mouth	Oued Tahadart	35.67	6.00	35.5698	-5.9960
4.01.02.02	Lix R. mouth	Oued Loukkos	35.25	6.33	35.2020	-6.1522
4.01.02.03	Subur R. mouth	Oued Sebou	34.67	6.33	34.2710	-6.6485
4.01.02.04	Emporicus bay	near Mehdia	34.33	6.17	34.2689	-6.6537
4.01.02.05	Sala R. mouth	Wadi Sala (Oued Bou Regreg)	34.17	6.17	34.0356	-6.8349
4.01.02.06	Sala city	Chellah, ruins near Salé	33.83	6.67	34.0071	-6.8209
4.01.02.07	Duos R. mouth	Oued Dir?	33.33	6.17	33.7190	-7.3419
4.01.02.08	Lesser Atlas Mtn.	Cap Mohammedia?	33.17	6.00	33.7190	-7.3981
4.01.02.09	Cusa R. mouth	Oued Mellah, its tributary: Oued el Hasser (Oued Haçar)	32.75	6.67	33.7040	-7.4124
4.01.02.10	Rusibis port	Casablanca	32.50	6.67	33.6029	-7.6191
4.01.03.01	Asana R. mouth	Oued Oum er Rbia, near Azemmour	32.00	7.00	33.3197	-8.3387
4.01.03.04	Mysocaras harbor	El Jadida (former Mazagan)	30.83	7.33	33.2568	-8.5024
4.01.03.05	Phthuth R. mouth	Oued Tensift?	30.50	7.50	32.0325	-9.3440
4.01.03.06	Cape of Heracles	Ras Cantin, Cap Beddouza?	30.00	7.50	32.5408	-9.2848
4.01.04.02	Cape Usadium	Cap Sim?	29.25	7.50	31.3898	-9.8423
4.01.04.03	Suriga	Essaouira (former Mogador)	29.00	8.00	31.5138	-9.7696
4.01.04.04	Una R. mouth	Oued Zeltene, Oued Ksob, near Ounara (Ounagha)?	28.50	8.00	31.4901	-9.7704
4.01.04.07	Greater Atlas Mtn.	Cap Rhir, Cap Ghir	26.50	8.00	30.6269	-9.8863
4.01.05.03	Tingis Caesarea	Tanger	35.92	6.50	35.7875	-5.8100
4.01.05.04	Ualon R. mouth	Oued el Liam	35.83	7.00	35.8290	-5.6446
4.01.05.05	Exilissa city	Ceuta	35.92	7.50	35.8883	-5.3167
4.01.05.06	Septem Fratres Mts.	Jebel Sidi Moussa	35.83	7.67	35.8979	-5.4108
4.01.06.02	Abila columna	Monte Hacho	35.67	7.83	35.8951	-5.2886
4.01.06.03	Cape of Phoebus	Punta Almina	35.50	8.00	35.9004	-5.2790
4.01.06.04	Cape Iagath	Ras el Aswad, Cabo Negro	35.08	8.33	35.6861	-5.2738
4.01.06.05	Thaluda (Thamulada) R. mouth	Oued Martil	35.00	8.50	35.6037	-5.2665
4.01.06.06	Cape Oleastron	Ras Menkal, Ras Makked?	35.17	8.83	35.4771	-5.1067
4.01.06.07	Akrath	Kaa Asrass, Quaa Asserasse, near the mouth of Oued Akherous	34.92	9.00	35.4113	-5.0678
4.01.07.01	Taenia Longa	Peñón de Vélez de la Gomera?	34.50	9.50	35.1719	-4.2989
4.01.07.02	Cape Sestiaria	Cap des Trois Fourches	35.00	10.00	35.4400	-2.9765
4.01.07.03	Rissadirum	Melilla	34.75	10.17	35.2918	-2.9383
4.01.07.04	Cape Metagonites	Cap de l'Eau	34.92	10.50	35.1483	-2.4238
4.01.07.05	Molachath R. mouth	Oued Moulouya	34.75	10.75	35.1231	-2.3431
4.01.10.16	Red Plains	Skoura?	30.00	9.50	31.0614	-6.5556
4.01.12.01	Diur Mts.	Jebel Sidi Bou Jemaa?	34.00	8.50	34.4229	-5.0432
4.01.13.02	Zilia	near Dchar Jedid (Dechra Jdid, Dchar Jadid), Had el Rharbia	35.17	6.50	35.5230	-5.9174
4.01.13.03	Lix	Lixus (near Larache)	34.92	6.75	35.1999	-6.1087
4.01.13.04	Oppinum?	Oppidum Novum (Khandak Hamar, Khendek Hamar, Jandaq Amar)?	35.33	7.50	35.4050	-5.8107

4.01.13.04	Oppinum?	Oppidum Novum (Ksar el Kebir, Castellum ad Lucus?)?	35.33	7.50	35.0015	-5.9065
4.01.13.05	Subur	Kenitra?	34.67	6.83	34.2649	-6.5766
4.01.13.06	Banasa	Sidi Ali bou Jenoun (Sidi Ali ben Jenoum), near Souk-Telata-du-Rharb	34.33	7.50	34.6015	-6.1152
4.01.13.07	Tamusida	Thamusida (Sidi Ali ben Ahmed)	34.25	7.00	34.3375	-6.4890
4.01.13.08	Gilda	Rirha?	33.92	7.83	34.3099	-5.9299
4.01.13.09	Gontiana	Souk el Arba?	34.50	7.67	34.6862	-5.9983
4.01.14.01	Baba	Bab Tisra, Bab Tissera?	34.33	8.17	34.1800	-5.7000
4.01.14.02	Pisciana	Sidi Larbi Boujema (Vopisciana, Bobiscianis)?	34.33	9.00	34.5355	-5.9271
4.01.14.03	Vobrix	Boured?	34.00	9.33	34.7323	-4.0936
4.01.14.04	Volubilis	Volubilis (Ksar Pharaoun)	33.67	8.25	34.0731	-5.5544
4.01.14.05	Herpis	Guercif?	33.75	10.33	34.2472	-3.3368
4.01.14.06	Tocolosida	Bled Takourart, Akbet el-Arabi	33.50	7.17	34.0381	-5.5810
4.01.14.07	Trisidis	Tamuda, Tremulis?	33.17	9.00	35.5557	-5.4049
4.01.14.08	Molochath	Maghraoua, Meghraoua, near El Malaïch and Tmourghout?	33.08	10.17	33.9318	-4.0480
4.01.14.09	Benta?	near Jbel Bent Abid, Aïn el Beïda?	32.83	9.50	34.1348	-5.3962
4.01.14.09	Benta?	Taza, near Oued el Abiod?	32.83	9.50	34.2259	-4.0111
4.01.15.02	Oikath (Thikath)	Tghat, near Jbel Trhat?	32.50	8.50	34.0404	-5.0090
4.01.15.03	Dorath	Rhmate, Rgmate, Rhemat, Aghmat, Agmet, Agmat?	31.25	9.00	31.4222	-7.8047
4.01.15.04	Watchtower of Bocchus	Zagora?	29.50	9.33	30.3200	-5.8190
4.01.16.02	Paina island	Porto Santo?	32.00	5.00	33.0600	-16.3300
4.01.16.03	Erytheia island	Madeira?	29.00	6.00	32.7500	-17.0000

Table 3. Known and tentative locations in Mauretania Caesariensis.

Ptolemy ID	*Ptolemy Name*	*Modern Name*	*Ptol. Lat.*	*Ptol. Lon.*	*Mod. Lat.*	*Mod. Lon.*
4.02.02.02	Great Cape	Cap Milonia	35.00	11.50	35.1018	-2.1548
4.02.02.03	Gypsaria harbor	Honaine?	34.75	11.83	35.1780	-1.6570
4.02.02.04	Siga	Takembrit	34.67	12.00	35.2680	-1.4504
4.02.02.05	Siga R. mouth	Oued Tafna	34.67	12.25	35.2966	-1.4711
4.02.02.06	Assarath R. mouth	Oued el Malah	34.50	12.50	35.4420	-1.2360
4.02.02.07	Portus Magnus	Mers el Kébir	34.50	12.75	35.7279	-0.7081
4.02.03.01	Chylemath R. mouth	Oued Chelif, (Chlef)	34.00	13.00	35.7065	-0.8851
4.02.03.02	Quiza colonia	Sidi Bel Atar?	34.00	13.33	36.0259	0.2666
4.02.03.03	Deorum harbor	Arzew?	33.75	13.50	35.8522	-0.3112
4.02.03.04	Arsenaria colonia	Bettioua (Saint-Leu, former Vieil Arzew)	33.83	13.83	35.8046	-0.2591
4.02.04.01	Cartennus R. mouth	Oued Allala (Oued Ben Ali)	33.67	14.25	36.5155	1.3104
4.02.04.02	Cartenna	Ténès	33.67	14.50	36.5111	1.3119
4.02.04.03	Carepula	Damous?	33.67	14.83	36.5498	1.7000
4.02.04.05	Lagnouton colonia	Le Guelta?	33.50	15.50	36.3608	0.8389
4.02.04.06	Cape of Apollo-1	Cap Ténès	33.67	15.50	36.5536	1.3611
4.02.04.07	Castra Germanorum	Beni Haoua (former El Kessour)	33.58	15.83	36.5307	1.5686

4.02.05.01	Canucis	Gunugu, Qubba, near Sidi Brahem (Sidi Brahim)	33.50	16.17	36.5691	1.8595
4.02.05.03	Iol Caesarea colonia	Cherchell	33.33	17.00	36.6053	2.1904
4.02.05.04	Tipasa	Tipasa	33.50	17.50	36.5946	2.4421
4.02.05.05	Via	Tombeau de la Chretienne, near Sidi Rached?	33.00	17.67	36.5750	2.5529
4.02.06.01	Icosium	Algiers?	33.00	18.00	36.7841	3.0579
4.02.06.02	Savus R. mouth	Oued Mazafran + Oued Chiffa (tributary)	33.33	18.17	36.6974	2.8032
4.02.06.03	Rustonium	Rusguniae (Tamentfoust)	32.75	18.50	36.8073	3.2307
4.02.06.04	Rusicibar	Rusubbicari (Zemmouri el Bahri, former Port-aux-Poules)	32.83	18.75	36.8012	3.5653
4.02.07.01	Modunga	Douar Mendil?	32.92	19.17	36.8354	3.6886
4.02.07.02	Serbetis R. mouth	Oued Sebaou	32.83	19.50	36.9107	3.8557
4.02.07.03	Cissa	Cissi (Djinet)	32.83	19.75	36.8781	3.7216
4.02.08.01	Addyme	Takdempt?	32.83	20.00	36.9068	3.8645
4.02.08.02	Rusuccoru	Rusuccuru (Dellys)	32.75	20.25	36.9137	3.9144
4.02.08.03	Iomnium	Tigzirt	32.75	20.50	36.8948	4.1235
4.02.08.04	Rusubisir	Rusippisir (Taksebt)	32.67	20.75	36.8975	4.1561
4.02.09.01	Rusazus	Azeffoun	32.67	21.00	36.8936	4.4198
4.02.09.01	Uabar	Ibahrizène?	32.50	21.50	36.8419	4.5433
4.02.09.02	Saldae colonia	Bejaia	32.50	22.00	36.7530	5.0908
4.02.09.03	Nasavath R. mouth	Oued Soummam	32.50	22.17	36.7291	5.0766
4.02.09.04	Chobath	Choba (Aokas)	32.33	22.67	36.6367	5.2461
4.02.10.01	Sisar R. mouth	Oued Agrioun	32.25	23.00	36.6412	5.3367
4.02.10.02	Iarsath	near Ziama Mansouriah	32.08	23.33	36.6609	5.4393
4.02.10.03	Cape Audum	Râs Talou'?	32.25	23.67	36.7808	5.5948
4.02.11.02	Audus R. mouth	Oued Kissir	32.00	23.83	36.7988	5.6778
4.02.11.03	Igilgili	Jijel	31.75	24.00	36.8248	5.7672
4.02.11.04	Gulus R. mouth	Oued Djendjene (Jinejene)	31.83	24.67	36.8134	5.8566
4.02.11.05	Assarath	Mechta Azaroûd?	31.75	25.17	36.8152	5.9330
4.02.11.06	Ampsagas R. mouth	Oued el Kebir	31.75	26.25	36.8710	6.0860
4.02.11.07	Ampsagas R. sources	Oued el Malah	26.00	26.00	35.9271	6.7287
4.02.14.01	E. end of Durdus Mts.	Monts de Tiaret?	29.50	15.00	35.3832	1.2878
4.02.14.03	Zalakus Mtn.	Djebel Ouarsenis?	31.67	16.00	35.8742	1.6322
4.02.15.04	Byryn (Byrbyr) Mtn.	Djebel Djurdjura	31.00	20.50	36.4477	4.2283
4.02.16.05	W. end of Buzara Mts.	Djebel Bous, near Bouzina	25.50	25.00	35.2147	5.9780
4.02.22.01	Vasbaria	Remchi?	34.00	12.50	35.0607	-1.4325
4.02.22.02	Kelama	Guelma	33.50	12.17	36.4672	7.4302
4.02.22.03	Urbara	Tlemcen	33.50	12.83	34.8792	-1.3153
4.02.22.04	Lanigara	Oujda?	33.00	12.00	34.6806	-1.9138
4.02.22.06	Atoa	Altava (Hadjar-Roum, ruins near Ouled Mimoun)	31.17	12.50	34.9018	-1.0271
4.02.22.07	Mniara	Maghnia (former Marnia)	33.00	12.83	34.8454	-1.7271
4.02.23.01	Timici	Ain Témouchent	33.17	13.83	35.3016	-1.1448
4.02.23.02	Astacilis	Hammam Bou Hadjar (Ad Dracones?)?	33.17	13.33	35.3716	-0.9689
4.02.23.04	Aripa	Arbal	30.83	14.00	35.4567	-0.6188
4.02.24.01	Victoria	Tessala?	33.00	14.50	35.2435	-0.7722
4.02.24.02	Giglue	Kalloule?	32.50	14.50	36.4208	1.2375
4.02.24.03	Bunogora	Bunobora (Benairia)	31.50	14.50	36.3550	1.3756
4.02.24.04	Vagae	Vagal (Sidi ben Thiour, 5 km North from Bou Kadir)	30.75	15.25	36.0738	1.0949

4.02.24.05	Manliana	Khemis Miliana (Malliana, former Affreville)	28.83	15.83	36.2622	2.2181
4.02.24.06	Apphar	Tepidae/Safar (Sidi Abdelli)?	33.25	14.67	35.0651	-1.1361
4.02.25.01	Oppidum Novum colonia	Aïn Defla (former Duperre)	32.67	16.00	36.2681	1.9675
4.02.25.02	Burca	Boghar?	30.75	16.83	35.9160	2.7166
4.02.25.03	Tarrum	Castellum Tingitanum (Chlef)?	30.00	16.25	36.1665	1.3326
4.02.25.04	Garra	Breira?	32.83	15.17	36.4488	1.6151
4.02.25.05	Zuchabbari	Miliana	32.67	16.83	36.3048	2.2262
4.02.25.07	Tenissa	Thanaramusa Castra (Berrouaghia)	31.17	17.83	36.1356	2.9143
4.02.26.01	Lamida	Lambdia (Medea)	31.33	18.50	36.2630	2.7582
4.02.26.02	Vasana	Sufasar (Dolfussville, Amoura Centre, Oued Chorfa)?	31.67	18.33	36.1785	2.5107
4.02.26.04	Binsitta	Timesratine?	30.67	18.50	36.3756	1.4614
4.02.26.05	Pegava	Tigava Castra (near Bel Abbas)	30.50	18.83	36.2291	1.6409
4.02.26.07	Thisizima	Tissemsilt?	29.17	18.17	35.6087	1.8124
4.02.26.08	Chizala	Tizi El Bir (Oulad ’Allal)?	32.50	18.67	36.6341	3.6824
4.02.26.09	Aquae Calidae colonia	Hammam Righa	32.17	18.00	36.3797	2.3989
4.02.27.01	Phloria	Bouïra?	31.67	19.33	36.3749	3.9020
4.02.27.03	Labdia	Rapidum, Rapidi (Nacereddine, former Sour Djouab)?	29.83	19.83	36.1376	3.4226
4.02.28.01	Tucca-1	Henchir el Abiod?	31.50	20.00	36.6090	6.2802
4.02.28.02	Badea	Bida (Djama-n-Saharidj, Djemaa Saharidj)	30.75	20.00	36.6833	4.2833
4.02.28.03	Gasmara	Bouzaréah?	32.67	18.00	36.7832	3.0166
4.02.28.04	Bida colonia	Blida	32.17	18.50	36.4729	2.8251
4.02.28.06	Thibinis	Tikobain?	31.00	21.00	36.7664	4.1753
4.02.28.07	Izatha	Larbaâ Nath Irathen?	30.33	21.00	36.6373	4.2042
4.02.29.03	Suburgia	Seghouane?	28.33	21.00	36.0013	2.9043
4.02.30.01	Thudaca	Castellum Tulei (Thala-Isli, near Diar Mami)?	31.33	20.83	36.7688	3.7925
4.02.30.02	Tigis	Tigisi (Taourga, Tawerga)	32.50	19.50	36.7933	3.9473
4.02.31.01	Sudava	Ad Sava Municipium (Bougaa)?	32.00	22.33	36.3329	5.0883
4.02.31.02	Tusiatath	Thénia (Tizi n At Aycha)	31.50	22.33	36.7245	3.5563
4.02.31.03	Ussara	Ouzera?	30.67	22.00	36.2542	2.8472
4.02.31.04	Uazagada	Uzinaza (Saneg)?	30.17	22.50	35.8485	2.8883
4.02.31.05	Auzia	Aumale, Sour el Ghozlane	29.67	22.17	36.1427	3.6914
4.02.31.06	Tubusuptu	Tubusuctu (Tiklat, near El-Ksour)	31.33	23.75	36.6530	4.8426
4.02.32.01	Robonda	Castellum Turrense (El Mehiris)?	31.33	23.33	35.7681	4.6531
4.02.32.02	Ausum	Akbou	30.67	23.00	36.4617	4.5355
4.02.32.03	Zaratha	Zarai (Zraïa)	30.50	23.50	35.8022	5.6774
4.02.32.04	Nababurum	Novar/Novaricia? (Beni Fouda)?	30.00	23.00	36.2861	5.6073
4.02.32.05	Vitaca	Vicus Augusti (Bir bou Saadia, near Mechta Larbaa, Oued Ftaïssa)?	29.50	23.75	36.0563	5.1515
4.02.32.06	Thubuna	Thubunae (Tobna ruins, near Bitam and Barika)	28.50	23.83	35.3500	5.3500
4.02.32.07	Thamaritha	Thacarata?/Thac (Aïn Touta)?	27.25	23.17	35.3766	5.8939
4.02.33.01	Augala	Centenarium Aqua Frigida (Taskriout, Tala N’Chrouft, Tala K'frida)	31.33	24.83	36.5666	5.2500

4.02.34.01	Sitiphi colonia	Sitifis, Sétif	29.33	26.00	36.1920	5.4043
4.02.34.02	Tumarra	Thamallula Antoniniani (Toumella)	29.00	26.50	35.9330	5.0306
4.02.34.03	Germiana	Djemorah?	28.50	26.75	35.0703	5.8426
4.02.34.04	Paepia	Ad Calceum Herculis (El Kantara, on Oued Bou Beyada)?	28.25	24.83	35.2203	5.7058
4.02.34.05	Vescethra	Vescera (Biskra)	27.50	24.17	34.8551	5.7239
4.02.34.06	Aegaea	Ad Aquas Herculis (Aïounet el Araïes, springs near Hammam Sidi el Hadj)?	27.17	26.17	35.1172	5.6098
4.02.35.02	Iulia Caesarea I.	Kêf Bisnês, Roche Barbar	33.67	17.17	36.6474	2.3451

Table 4. Known and tentative locations in the province of Africa.

Ptolemy ID	*Ptolemy Name*	*Modern Name*	*Ptol. Lat.*	*Ptol. Lon.*	*Mod. Lat.*	*Mod. Lon.*
4.03.03.02	Angle of the Numidian Bay	near Oued Zhour	31.75	27.00	36.9322	6.2510
4.03.03.03	Greater Kollops or Chullu	Collo, near Pointe Djerda	32.33	27.33	37.0076	6.5703
4.03.03.04	Rusicada	Rusicade (Skikda)	32.50	27.75	36.8796	6.9049
4.03.03.05	Cape Treton	Râs el Kal'â?	32.75	27.67	36.9643	6.7517
4.03.03.06	Uzicath	Zacca (Cap de Fer)	32.50	28.17	37.0734	7.1913
4.03.04.01	Holcachites Bay	near Oued Sidi Akacha?	32.00	28.67	37.0752	7.2885
4.03.04.02	Takatye	Tacatua (Chetaibi, near Cap Takouch)	32.50	29.00	37.0650	7.3810
4.03.04.03	Lesser Kollops	Koudiat el Guelaa?	32.58	29.33	36.9498	7.6443
4.03.04.04	Siur port	Anse de Sidi Begra cove, near Sidi Taher?	32.67	29.67	36.9493	7.7040
4.03.05.01	Cape Hippo-1	Cap de Garde	32.75	30.00	36.9671	7.7921
4.03.05.02	Cape Stoborron	Plage Fabre	32.67	30.17	36.9335	7.7667
4.03.05.03	Aphrodisium-1	Annaba, former Bone	32.50	30.33	36.9059	7.7658
4.03.05.04	Hippo Regius	Hippo Regius (ruins near Annaba, former Bone)	32.25	30.50	36.8814	7.7470
4.03.05.05	Rubricatus R. mouth	Oued Mafragh	32.25	30.75	36.8469	7.9447
4.03.05.06	Thabraca colonia	Tabarka, Tabarqah	32.33	31.25	36.9562	8.7485
4.03.06.01	Temple of Apollo	Sidi Mechreg	32.83	31.67	37.1594	9.1183
4.03.06.02	Altar of Poseidon	Cap Blanc?	32.75	32.00	37.3386	9.8368
4.03.06.03	Hippo Diarrhytus colonia	Bizerte	32.75	32.50	37.2763	9.8731
4.03.06.04	Thinisa	Ras el Djebel	32.50	33.00	37.2209	10.1508
4.03.06.05	Cape of Apollo-2	Ras Sidi Ali El Mekki	33.25	33.50	37.1773	10.2810
4.03.06.06	Utica	Utique (Henchir Bou Chateur)	32.75	33.67	37.0566	10.0622
4.03.06.07	Cornelia Camp	Castra Cornelia (Kalaat El Andalouss)	32.50	33.67	37.0610	10.1163
4.03.06.08	Bagradas R. mouth	Oued Medjerda (old mouth)	32.67	34.00	37.0869	10.1879
4.03.07.01	Carthage, a large city	Carthage ruins (Byrsa)	32.67	34.83	36.8524	10.3236
4.03.07.02	Catadas R. mouth	Oued Meliane (old mouth)	32.50	34.83	36.7716	10.2921
4.03.07.03	Maxula colonia	Radès	32.67	35.00	36.7663	10.2812
4.03.07.04	Carpis colonia	El Mraïssa, near Korbous (Qurbus), on Ras el Fortas	33.00	35.00	36.9370	10.7999
4.03.07.05	Misua	Sidi Daoud (in Wilayat Tunis al Janubiyah)	33.17	35.00	37.0167	10.9157
4.03.08.01	Cape Hermaea	Cap Bon (Ras Adar)	33.58	35.00	37.0885	11.0348
4.03.08.02	Aspis-1	Kélibia (Qulaybiyah)	33.33	35.33	36.8378	11.1158

4.03.08.03	Curubis colonia	Korba	33.17	35.50	36.5674	10.8624
4.03.08.04	Neapolis colonia	Nabeul	33.00	35.75	36.4407	10.7194
4.03.09.01	Siagul	Siagu (Ksar-ez-Zit, near Bir Bou Regba)	32.83	36.00	36.4348	10.5813
4.03.09.02	Aphrodisium-2	Prhedis majus (Sidi-Khalifa, Sidi-Khlifa)	32.67	36.25	36.2489	10.3999
4.03.09.03	Adrumetus colonia	Hadrumetum (Sousse)	32.67	36.67	35.8172	10.6366
4.03.09.04	Ruspina	Ruspinum (Henchir Tenir, 2 miles or 3 km southwest of Monastir port)	32.83	36.83	35.7711	10.8271
4.03.10.01	Leptis Minor colonia	Lepti Minus (Lamta, Lemta)	32.58	37.17	35.6781	10.8663
4.03.10.02	Thapsus	Ras Dimasse	32.50	37.50	35.6228	11.0433
4.03.10.03	Acholla	Ras Bou Tria	32.75	37.75	35.0759	11.0189
4.03.10.04	Ruspe	Rosfa	32.33	38.00	35.0186	11.0057
4.03.10.05	Cape Brachodes	Cap Afrique?	32.33	38.50	35.5097	11.0822
4.03.10.06	Usilla	Inchilla, near Jebiniana (Djebeliana, Jabinyanah)	32.17	38.17	34.9992	10.9698
4.03.10.07	Taphrura	Taparura (Sfax)	32.00	38.50	34.7359	10.7609
4.03.11.02	Thaenae	Thaenae (Thyna)	31.67	38.50	34.6495	10.6834
4.03.11.03	Macomada	Macodama (Bordj Younga, near Mahres, Mahares, Mahires, Macros)	31.25	38.50	34.4673	10.4112
4.03.11.04	Triton R. mouth	Oued el Melah	30.75	38.67	34.0077	10.0445
4.03.11.05	Tacape	Gabès (Qābis)	30.50	38.83	33.8780	10.0922
4.03.11.06	Gichthis	Gigthis (Bou Ghrara)	30.83	39.33	33.5327	10.6775
4.03.12.01	Hedaphtha	Gidaphta (Ras Segala)?	31.25	40.17	33.5362	10.9284
4.03.12.02	Cape Zitha	Ras el Khsîm?	31.67	40.67	33.6042	10.9131
4.03.12.03	Sabratha	Sabratah	31.50	41.00	32.8053	12.4851
4.03.12.04	Pisindon harbor	Pisida (near Abu Kammash, Bu Chemmasc)	31.50	41.25	33.0692	11.8163
4.03.12.05	Oea	Tripoli	31.67	41.50	32.8999	13.1758
4.03.12.06	Garapha harbor	Gaphara (Marsa al Jazirah, Marset ed-Dzira, Marset ed-Dzeira)	31.67	41.75	32.7838	13.8513
4.03.13.01	Neapolis or Leptis Magna	Lebda (ruins near Al Khums, Al-Khums, Khoms)	31.67	42.00	32.6323	14.3093
4.03.13.02	Kinyps R. mouth	Wadi Zamzam mouth at Sabkhat al ‘Uwaynāt?	31.17	42.25	31.5376	15.5445
4.03.13.03	Barathia	Tubartis, Thubactis (Misratah, Misurata)?	31.17	42.67	32.3745	15.0904
4.03.13.04	Cape Trieron	Cape Cephalae (Cap Misurata)	31.33	42.92	32.4103	15.1002
4.03.13.05	Cisternae	Ad Cisternas (Bi’r al Qalb, a well near Zliten)?	31.00	43.25	32.4976	14.5750
4.03.14.02	Macomaca village	Macomades (Marsa Misurata, Gasr Ahmed, in Bushaifa bay)?	30.75	43.50	32.3726	15.2124
4.03.14.03	Aspis-2	Ad Ficum (Bwayrat al Hasun, Bu'ayrat al Hasun, Buerat el-Hsun, Buwayrāt al Ḥasūn)	30.33	43.67	31.4025	15.7309
4.03.14.04	Sacazama village	Bin Jawad, Bin Jawwād	30.00	43.92	30.7927	18.0684
4.03.14.05	Tower of Euphranta	Marsa Zaafran, Mersa Zafferan, near Surt	29.67	44.17	31.2155	16.7024
4.03.14.06	Pharas village	Charax (As Sultan, Medina Sultan, near Surt)	29.00	44.50	31.1306	17.1027
4.03.14.07	Oesporis village	Eperos (Abyār an Na‘īm)?	29.00	45.00	31.0763	17.3367
4.03.14.08	Cape Hippo-2	Ra’s al ‘Uwayjā’	29.00	46.00	30.9218	17.8547
4.03.14.09	Philaeni village	Ra’s al ‘Alās	29.00	46.75	30.3820	18.7902

4.03.14.10	Altars of Philaeni, border mark of Africa and Cyrenaica	Qarārat Qaṣr at Turāb	29.00	46.75	30.3030	18.7923
4.03.16.01	E. end of Buzara Mts.	Djebel Aidel, near Khenchela?	27.00	28.00	35.4315	7.1241
4.03.16.02	Audus Mtn.?	Djebel Asker?	29.50	28.50	35.4500	6.2167
4.03.16.02	Audus Mtn.?	Jebel el Ajered?	29.50	28.50	35.4655	8.5544
4.03.17.01	Cirna Mtn.	Djebel Gorra	30.00	33.00	36.4550	9.0939
4.03.17.02	Hipponitis lake	Hipponensis (Lac de Bizerte)	32.50	32.67	37.1900	9.8600
4.03.17.03	Sisara lake	Lake Ishkel	31.00	33.00	37.1600	9.6800
4.03.18.04	Zeus Mtn.	Koudiat Bou Mraou?	31.25	37.50	35.9226	9.5286
4.03.19.02	Tritonitis lake	Chott el Fejaj, Chott el Fedjadj	29.67	38.67	33.8798	9.1539
4.03.19.03	Pallas lake	Chott el Jerid, Chott el Djerid	29.25	38.50	33.6405	8.3551
4.03.19.04	Libyan lake	Chott Melhrir	28.25	38.50	34.3000	6.3000
4.03.20.01	Gilion Mtn.	Ra's al Khaliqah, Ra's al Bunduq (near Ġaryān)?	29.50	40.50	31.9858	13.2483
4.03.20.07	Acabe spring, source of Kinyps R.	ʻAyn al Ḥamām?	26.17	45.25	29.0902	15.7925
4.03.28.04	Cirta Iulia colonia	Cirta (Constantine)	31.33	26.83	36.3678	6.6119
4.03.28.05	Mireum	Mileum, Milevum, Milev (Mila)	30.33	26.67	36.4520	6.2693
4.03.28.06	Vaga	Béja	31.67	28.00	36.7240	9.1789
4.03.28.07	Lares	Lorbeus village, Station de Lorbeus, Henchir Lorbeus, Henchir-Lorbeus	30.67	27.50	36.0743	8.8400
4.03.28.08	Aetari	Vatari (Faïd es Siouda)?	29.67	27.67	35.2000	8.2667
4.03.28.09	Azama	Azimacia (Hamma, Le Hamma, Hammam Essalihine, Salhine)	27.83	27.50	35.4401	7.0845
4.03.29.02	Culcua colonia	Cuicul (Djemila)	31.25	28.50	36.3209	5.7362
4.03.29.03	Thunudromum colonia	Thignica (Ain-Tounga)?	30.50	28.33	36.5236	9.3616
4.03.29.04	Aspucca	Aptucca, Aptuca (Henchir-Oudeka/Henchir-Semmech)?	32.00	29.50	36.4093	8.9403
4.03.29.05	Simisthu colonia	Simitthus (Chemtou)	31.33	29.00	36.4908	8.5736
4.03.29.06	Thuburnica	Sidi Ali bel Kassem, ruins	31.67	30.00	36.5262	8.4678
4.03.29.07	Tucca-2	Thuccabor (Toukaber, Toukabeur)	31.33	29.50	36.7100	9.5167
4.03.29.08	Thigiba	Thigibba Bure (Djebba)	30.75	29.50	36.4764	9.0832
4.03.29.09	Thubursica colonia	Thubursicum Bure (Tabursuq, Teboursouk)	30.50	29.33	36.4569	9.2475
4.03.29.10	Ucibi	Ucubi (Henchir el Goussat, Henchir-Kaoussat)	29.75	30.00	36.2385	8.8922
4.03.29.11	Gausaphna	Gadiaufala, Gazophyla (Ksar-Sbahi, Ksar Sbehi)	31.00	29.25	36.0823	7.2579
4.03.30.01	Lambaesa	Tazoult-Lambese	30.00	29.00	35.4892	6.2599
4.03.30.03	Thubutis	Tébessa?	28.33	29.50	35.3833	8.0998
4.03.30.04	Bulla Regia	Hammam Daradji (Souk-el-Arba)	31.50	30.67	36.5589	8.7570
4.03.30.05	Sicca Veneria colonia	El Kef	30.83	30.50	36.1826	8.7132
4.03.30.06	Assurus colonia	Zanfour	30.50	30.83	35.9920	9.0207
4.03.30.07	Naraggara	Sakiet Sidi Youssef	30.17	30.00	36.2234	8.3561
4.03.30.08	Theveste	Thagaste (Souk Ahras)?	29.75	30.50	36.2366	8.0004
4.03.30.09	Thunusda	Thunusuda (Sidi Meskine)	32.00	31.67	36.4518	8.6659
4.03.30.10	Madurus colonia	Madauros, Madaura, Madaurus (M'Daourouch)	31.50	32.00	36.0778	7.9024
4.03.30.11	Ammaedara	Haïdra	30.50	32.17	35.5649	8.4535
4.03.30.14	Sedne	Claudi (Henchir Sedra)?	28.75	31.67	35.4635	6.9050

4.03.31.03	Canopisi	Thisitana/Phisitana/Pisitana (Bechateur)	32.50	32.25	37.3057	9.7392
4.03.31.04	Meltida	Matar, Matarensis (Mateur)?	31.50	32.67	37.0405	9.6687
4.03.31.05	Uzan	Uzalis (Alia, El Alia, Al Aliyah)	32.33	33.25	37.1690	10.0340
4.03.31.06	Thisica	Thizika (Garaet et Tachegga, Ain-Tachegga)	32.00	33.25	36.9829	9.6807
4.03.31.07	Cipipa	Gisipensis, Kipipa (Ra's az Zabib, Zebib)?	31.75	34.00	37.2655	10.0645
4.03.31.08	Theudali	Theudalis (Henchir Aouma, Henchir-Aouan, near Zaarour)	31.67	33.33	37.1287	9.7427
4.03.31.09	Avitta	Avitta Bibba (Bou Ftis, Bou-Ftis)	30.25	33.50	36.4103	9.7002
4.03.32.01	Tobrus	Thuburbo Minus (Tebourba, Taburbah)	30.50	34.00	36.8296	9.8401
4.03.32.02	Eilika	Inuca, Unuca (Banrane, Bordj-Bahran)?	30.33	34.50	36.7400	10.0317
4.03.32.03	Tucca-3	Thugga, Thucca (Dougga)	29.83	34.00	36.4237	9.2202
4.03.32.04	Dabia	Agbia (Henchir Hedja, near Nouvelle Dougga)?	29.75	33.00	36.3931	9.2283
4.03.32.05	Bendina	Marcimeni, Marcimani (Ain Beida)?	29.33	34.50	35.7968	7.3928
4.03.33.01	Aquae Calidae	Aquae Aptuccensium, Aquae Calidae Cirnensis (Hammam Biada, Hammam-Biadha)	28.25	33.67	36.4253	8.9528
4.03.33.02	Zigira	Jabal as Sukhayrah, Djebel Skrira, Skhiraat	28.83	33.17	36.5938	9.4041
4.03.33.03	Thasia	Thacia (Messaoudi, Bordj Mes-saoudi)	27.75	33.00	36.2976	9.0550
4.03.33.04	Thunuba?	Althiburos (Medeina, Mdeina)?	27.50	33.33	35.8726	8.7863
4.03.33.04	Thunuba?	Tajerouine?	27.50	33.33	35.8853	8.5531
4.03.33.05	Muste	Musti (Al Karib, El Krib, Le Krib)	27.50	33.67	36.3360	9.1431
4.03.33.06	Themisua	Thimisua (Gaffour, Gaafour, Qa Afur)	28.67	34.67	36.3107	9.3192
4.03.33.07	Zama Maior	Al Jamah, Jama, Djama	28.00	34.33	36.1117	9.2858
4.03.33.08	Timica	Thimida Bure (Kouchbatia)?	27.67	34.83	36.4942	9.1550
4.03.33.09	Tuscubis	Siguese, near Jebel Kebbouch?	28.17	35.50	36.2077	8.9389
4.03.34.05	Vol	Vallis, Volitana (Sidi Medien)	32.50	34.75	36.3341	10.0894
4.03.34.06	Thimisa	Thimida Regia (Sidi Ali-es-Sed-fini)	32.17	35.00	36.6404	10.1299
4.03.34.07	Cuina colonia	Vina (Henchir-el-Maden)?	31.50	35.50	36.5105	10.5507
4.03.34.08	Uthina	Oudna, Oudhna (Bin Arus)	31.33	34.25	36.6086	10.1692
4.03.34.09	Abdira?	Abbir Cella (Henchir-en-Naam)?	30.83	34.17	36.4666	9.8442
4.03.34.09	Abdira?	Abbir Maius (Henchir-el-Krendeg, el-Khandag)?	30.83	34.17	36.3740	10.0088
4.03.35.01	Mediccara	Mediccera (Aïn Mdeker, Aine-Medeker, Ain Medheker, Ain-Medeker)	31.00	35.50	36.2040	10.2755
4.03.35.02	Thuburbo	Thuburbo Maius, ruins (Henchir Kasbat)	30.17	35.00	36.4010	9.9049
4.03.35.03	Tucma	Turris (Henchir-el-Aouinia)?	30.17	35.50	36.6561	9.7918
4.03.35.04	Bulla Mensa	Bulla Mesa (Table de Jugurtha, near Kalaat es Senam)?	30.00	34.33	35.7443	8.3782
4.03.35.05	Cerbica	Chebika, Ash Shubaykah?	30.00	36.00	35.0004	8.8538
4.03.35.06	Nuroli	Numluli (Henchir Matria)	29.50	34.33	36.5244	9.2214
4.03.35.07	Ticelia	Tichilla (Testour, Tastur)	29.00	34.67	36.5514	9.4489

4.03.36.01	Sasura	Sufetula (Subaytilah, Sbeitla, near Jebel Sqhira)	29.67	36.00	35.2418	9.1189
4.03.36.02	Kilma	Cillium (Kasserine)	29.17	35.50	35.1675	8.7994
4.03.36.03	Vepillium	Kebili, Qibilī?	29.00	36.25	33.7024	8.9697
4.03.36.04	Thabba	Thabbora (Henchir-Tambra)	28.67	35.33	36.3810	9.4429
4.03.36.05	Tichasa	Thiges, Castellum Thigensium (Henchir-Ragoubet)	28.67	36.00	34.2459	8.5446
4.03.36.06	Negeta	Negga (Nagga, Naqqah)	27.83	36.00	33.7405	8.8364
4.03.36.07	Bunthum	Bennafa (Skhira)?	29.33	36.25	34.2988	10.0653
4.03.37.02	Almaina	Chul (Beni Khalled, former Medeina)?	33.00	35.25	36.6492	10.5910
4.03.37.03	Uticna	Uppenna (Friguia, near Enfi-dha)	32.50	35.67	36.1898	10.4132
4.03.37.05	Turza	Gurza (Kalaa Kebira)	31.83	35.67	35.8639	10.5350
4.03.37.06	Ulizibirra	Uluzibbira, Ulisippira (Henchir Zembra, Henndi es Saada, Essed-Nord)	31.33	36.00	35.9586	10.4411
4.03.37.07	Orbita	Bordj-el-Assa-el-Jeriba, near Sebkhet Assa Jiriba?	32.00	36.33	36.1262	10.4480
4.03.37.08	Uzita	Henchir-Makrceba (Henchir Makhreba)	32.33	36.83	35.6870	10.7540
4.03.37.09	Gisira	Chusira (Kasra, Kesra, Kessera)	31.75	36.33	35.8135	9.3663
4.03.37.10	Zurmentum	Ziqua (Zaghouan), near Mount Ziquensis (Djebel Zarhouan)?	31.50	37.00	36.3871	10.1312
4.03.37.11	Zalapa	Sullecthum (Salakta)?	31.75	36.75	35.3929	11.0488
4.03.38.01	Augustum	Giufi (Bir M'cherga, Bir al Mashariqah, M'Nagha, MVNI-CIPIVM AVRELIVM ALEXAN-DRIANVM (sic) AVGVSTVM MAGNVM GIVFITANVM)	30.67	36.33	36.5183	9.9579
4.03.38.02	Leae	Aeliae (Henchir-Mraba)	30.17	36.33	35.4232	10.4377
4.03.38.03	Avidus	Avidus Vicus (Zeramedine, Zramdine)	30.00	36.67	35.5748	10.7363
4.03.38.04	Ubata	Ubaza Castellum (Terebaza)	29.33	36.75	34.9120	7.7348
4.03.38.05	Tisurus	Thusuros (Tozeur)	28.67	36.83	33.9240	8.1312
4.03.39.01	Thysdrus	El-Djem	32.17	37.83	35.2964	10.7069
4.03.39.03	Segiensis	Segermes (Henchir-Harat)	31.50	37.75	36.3450	10.3017
4.03.39.05	Byzacina	Henchir Bichka, near Bir Bichka	30.75	37.83	34.8930	10.4040
4.03.39.06	Targarum	Thagari, Thagari maius (Henchir Tell-el-Caid, near Bir el Ouja)	30.75	37.25	36.4665	9.8867
4.03.39.07	Cararus	Bararus (Rougga)	30.33	37.00	35.2119	10.7912
4.03.39.08	Capsa	Capsa Iustiniana (Gafsa)	29.75	37.50	34.4157	8.7868
4.03.39.09	Putea	Putea Pallene	29.17	37.75	33.3167	11.1998
4.03.40.01	Caraga	Ksar-Graouch?	29.67	38.17	34.4414	9.4658
4.03.40.02	Muruis	Mahres, Mahares, Mahires, Macros?	30.75	38.17	34.5275	10.5008
4.03.40.03	Zugar	Zagrata, Bir az Zuqratah, Bir Zougrata?	30.17	38.00	34.1641	9.7571
4.03.41.02	Chuzis	Douz?	30.00	39.50	33.4611	9.0198
4.03.41.03	Sumucis	Mumucis (Matmata)?	30.50	40.33	33.5439	9.9653
4.03.41.06	Syddenis	Thenteos (Zintan, Alzintan, az-Zintan)?	31.17	41.67	31.9304	12.2620
4.03.41.07	Azuis	Auxiqua (Qaryat Al Qaddahi-yah, Qaryat al Qaddāḥīyah)?	30.50	42.75	31.3646	15.2397

4.03.41.08	Gerisa	Qirdah (Ghirzah)	30.83	43.00	30.9467	14.5510
4.03.42.01	Ammonos	Ad Ammonem (Mellita)	30.67	42.00	32.8407	12.2671
4.03.42.03	Musti village	Mizdah	28.67	42.33	31.4383	12.9725
4.03.42.04	Butta	Quṭṭah, Quttah, Gotta?	28.50	42.67	27.4839	13.7916
4.03.42.05	Tege	Tabaqah, Toubga?	27.50	42.67	30.4310	13.3170
4.03.43.02	Sicapha	Al Hayshah, Al Hishah?	30.00	43.17	31.6485	15.2776
4.03.43.03	Uddita	Waddān, Waddan?	28.67	43.33	29.1608	16.1342
4.03.43.04	Galybe	Galsa, Galia, Gholaia (Bu Njem, Bu Nujaym, Abu Nujaym)	29.17	43.67	30.5782	15.4130
4.03.43.05	Thagulis	Tugulus (Qasr al-Haddadiyah)	28.00	44.50	30.5499	18.4667
4.03.44.02	Hydras I.	Srîdjîna	33.00	28.00	36.9377	6.8861
4.03.44.03	Galata I.	La Galite	33.67	31.00	37.5262	8.9290
4.03.44.04	Dracontia I.	Île Plane	34.25	33.25	37.1814	10.3283
4.03.44.05	Aegimorus I.	Zembra Island	33.25	34.25	37.1262	10.8057
4.03.44.06	Larunesia (2)	Linosa Island	33.50	37.00	35.8655	12.8678
4.03.44.08	Lopadusa I.	Lampedusa Island	33.33	39.00	35.5140	12.5824
4.03.44.09	Aethusa I.	Lampione Island	33.33	39.50	35.5500	12.3167
4.03.45.01	Cercina I. and town	Kerkennah: Mellita (Qarqan-nah)	32.25	39.00	34.6518	11.0331
4.03.45.03	Gerra	Girba (Djerba, Houmt El Souk)?	31.25	39.25	33.8773	10.8551
4.03.45.04	Meninx	Meninge (Bordj el-Kantara)	31.33	39.50	33.6842	10.9211
4.03.46.01	Misynus I.	El Gataâya el Bahria?	30.67	44.67	33.7323	10.7154
4.03.46.02	Pontia I.	El Qetaya el Guéblïa?	30.25	45.33	33.6915	10.7746
4.03.46.03	Gaia I.	Jlij?	29.67	46.00	33.5971	10.8675
4.03.47.02	Cossyra I. and town	Pantelleria: Pantelleria	34.33	37.33	36.8284	11.9461
4.03.47.03	Gaulos I. and town	Gozo: La Cittadella	34.67	38.67	36.0464	14.2394
4.03.47.05	Melite I. and town	Malta: Rabat	34.67	38.75	35.8815	14.3987
4.03.47.06	Peninsula		34.75	38.67	35.9813	14.3492
4.03.47.07	Temple of Hera	Valetta	34.67	39.00	35.9000	14.5150
4.03.47.08	Temple of Heracles	Mnajdra	34.08	38.75	35.8267	14.4364

Table 5. Known and tentative locations in Libya Interior.

Ptolemy ID	*Ptolemy Name*	*Modern Name*	*Ptol. Lat.*	*Ptol. Lon.*	*Mod. Lat.*	*Mod. Lon.*
4.06.03.05	Hesperius or the Great bay	Cap Blanco?	4.00	14.00	20.7709	-17.0442
4.06.05.06	Cape Gannaria	Cap d'Aglou?	20.50	9.50	29.6756	-9.9824
4.06.06.02	Nuius R. mouth	Oued Noun, Oued Assaka, Oued Asaca?	18.33	10.00	29.1403	-10.4100
4.06.06.04	Massa R. mouth	Oued Drâa (former Wady Nun)?	16.50	10.50	28.6813	-11.1201
4.06.06.06	Daradus R. mouth	Oued Chebeika, Oued Chebika, Oued Echdida, Boca Grande (former Wady Draa)	15.00	10.00	28.2933	-11.5388
4.06.06.07	Magnus Portus	El Khebita (former Puerto Cansado), Lagune de Khnifiss	14.00	10.00	28.0292	-12.2381
4.06.06.09	Cape Arsinarium	Cap Juby, Cape Juby?	12.00	8.00	27.9534	-12.9171
4.06.07.03	Periphosius harbor	Perphosius Portus, Perfa Grande (Tarfaya)	10.50	11.00	27.9432	-12.9240
4.06.07.04	Cape Catharum	Cabo Bojador, Cape Bojador, Cape Boujdour, Ra's Boujador	9.50	12.50	26.1264	-14.5004
4.06.07.06	Cape Hesperu Keras	Punta Durnford? *Hanno's Horn of the West*	8.00	13.00	23.6448	-16.0068

4.06.07.08	Hypodromus Aethio-pia	N'Tireft, at Angra del Caballo (former Angra dos Caballos)?	5.25	14.00	24.0720	-15.5766
4.06.08.02	Mandrus Mts.	Mount Moudras	19.00	14.00	30.7931	-7.5360
4.06.08.05	Sagapola Mts.	Jbel Toubkal	22.00	20.33	31.0604	-7.9152
4.06.08.07	Ryssadium Mts.	Mount Rjoute?	11.00	17.00	31.1867	-7.6696
4.06.09.01	Theon Ochema Mtn.	Pico de Teide, Mount Teide?	5.00	19.00	28.2724	-16.6425
4.06.09.03	Caphas Mts.	Azilal Zaït Ououchchene?	10.00	27.00	32.0176	-5.6366
4.06.10.01	Usargala Mts.	Djebel Tadinart?	20.50	33.00	35.2823	7.3670
4.06.11.04	Kinyps R. becomes one	Wādī Qarzah?	25.00	42.00	31.0172	14.6705
4.06.12.01	Garamantica defile	Wadi Al Hayaa, Wadi el Agial	10.00	50.00	26.4215	12.6178
4.06.12.01	Thala Mts.	Mount Thala?	10.00	38.00	26.5140	5.8076
4.06.12.02	Arualtes Mtn.	Guelb el Atrous, in Tindouf Mts.?	3.00	33.00	26.3177	-5.9668
4.06.12.03	Arangas Mtn.	Hoggar Mountains	1.58	47.50	23.2898	5.5364
4.06.13.04	Gir R. becomes one	Oued Djedi and Oued Biskra join?	16.00	42.00	34.6488	5.8603
4.06.13.05	Turtle lakes	Chott el Gharsa, Chott el Rharsa; Chott Khalla; Chott Bouras, etc.?	20.00	49.00	34.1209	7.8926
4.06.13.06	W. end of nameless R.	near Oglat el Baadja?	16.00	46.00	34.2775	6.7349
4.06.13.07	E. end of nameless R.	?	15.00	50.00	34.0520	7.3715
4.06.13.07	Nuba lake	Chott Felrhir, Chott Merouane?	15.00	50.00	34.0204	6.0965
4.06.14.04	Nigritis lake	near Abadla?	18.00	15.00	31.1460	-2.7758
4.06.14.12	N. turn of Daradus R.	Oued Drâa near Ouarzazate	17.00	21.00	30.9274	-6.7672
4.06.14.13	S. turn of Daradus R.	Oued Drâa at Tizi n' Timrha-rine	13.50	21.00	29.8623	-5.5398
4.06.24.01	Autolalae	Aglou, Tnine Aglou, near Ahl Aglou, a tribal area?	23.83	10.00	29.7650	-9.8100
4.06.24.02	Thuilath	Telouet?	21.67	11.50	31.2870	-7.2367
4.06.24.04	Magura	Tamegrout, Tamegroute?	15.00	12.50	30.2623	-5.6793
4.06.24.06	Iarzitha	ruins near Ouarzazate?	12.25	16.33	30.9522	-6.7604
4.06.25.02	Talubath	Tabelbala	22.67	18.67	29.4054	-3.2571
4.06.25.03	Malachath	Melouka?	20.25	20.33	27.8733	-0.3431
4.06.25.04	Thucabath	Hassi Takbit, Tiquebit?	19.50	18.00	30.2500	-4.5167
4.06.25.05	Byntha	Ababsa (Beni-Abbes)?	21.00	20.25	30.1230	-2.1736
4.06.26.01	Anygath-1	Agdz?	14.00	20.50	30.7076	-6.4486
4.06.27.01	Pesside	Zenaga, in Figuig (Tazdayt)?	18.00	19.00	32.0997	-1.2362
4.06.27.02	Thige	Taghit?	17.50	21.00	30.9232	-2.0314
4.06.27.03	Cuphe	El Kef?	18.00	23.25	29.3324	0.3256
4.06.27.04	Nigira metropolis	ruins near Reggane (Argan)?	17.67	25.67	26.7435	0.1420
4.06.27.05	Uellegia	ruins Sidi Issa, near Aoulef?	16.67	28.50	27.0152	1.0262
4.06.27.06	Tagama	Gemellae (El-Kasbat, ruins near Guerdema)?	17.00	30.00	34.6366	5.5229
4.06.27.07	Panagra	El Menia, former El Golea?	16.67	31.00	30.5828	2.8936
4.06.28.02	Punse	Kenadsa?	17.00	18.00	31.5559	-2.4406
4.06.28.04	Thamondocana	Tamentit, Tamantit?	17.00	23.00	27.7650	-0.2605
4.06.28.05	Durdum	Adrar?	15.00	31.00	27.8660	-0.3014
4.06.29.02	Silice	Thelepte	24.50	29.00	34.9672	8.5865
4.06.29.03	Buthuris	Ad Turres (Tamaghzah, Tamerza)	24.00	31.00	34.3889	7.9487
4.06.29.04	Anygath-2	Guentis	24.00	33.00	34.9954	7.3001
4.06.29.05	Thabudis	Thabudeos, Tabudium Oppi-dum (Tehouda)	22.00	34.00	34.8026	5.8955

4.06.30.02	Gedanos	Cidamus (Ghadamis, Ghadames)	24.50	40.00	30.1339	9.4968
4.06.30.03	Vanias	Baracum (Brak, Brach)?	22.67	41.00	27.5499	14.2716
4.06.30.04	Sabae	Sabha, Sabhah, Sebha	23.00	43.00	27.0499	14.4135
4.06.30.05	Bouata	Ghat	21.50	39.00	24.9656	10.1800
4.06.30.06	Bedirum	Dedris (Idrī, Adiri, Edri)	21.67	41.00	27.4450	13.0530
4.06.30.07	Garama metropolis	Germa (Jarmah)	21.50	43.00	26.5234	13.0366
4.06.30.08	Thumelitha	Turris Tamalleni, Civitas Nybgenorium (Telmine)	19.00	41.00	33.7156	8.9204
4.06.31.02	Gira metropolis	Ghardaia?	18.00	36.00	32.4890	3.6737
4.06.32.01	Thycimath	Temacine, Temassin?	19.67	38.00	33.0147	6.0256
4.06.32.02	Geua	Djamaa	19.00	39.00	33.5337	6.0052
4.06.32.03	Badiath	Badias (Badès)	17.00	40.00	34.7475	6.6645
4.06.32.05	Turcumuda	Touggourt?	15.00	41.50	33.1001	6.0667
4.06.32.07	Artagira	Agarlabas (Henchir Mgarine, near Oued Mgarine)?	18.00	44.00	33.7767	9.4424
4.06.32.08	Rhubune	Ad Templum (Jemna, Jamnah, Djemna)?	15.00	46.00	33.5620	9.0168
4.06.32.09	Lynxama	Samnū?	20.67	48.50	27.2746	14.8819
4.06.33.03	Kerne	Selvagem Grande Island?	25.67	5.00	30.1451	-15.8653
4.06.33.04	Hera I. or Autolala	Isla Graciosa?	23.83	8.00	29.2516	-13.5050
4.06.34.02	Aprositos I.	Isla de Alegranza	16.00	0.00	29.4000	-13.5100
4.06.34.03	Hera I.	Lanzarote?	15.25	1.00	29.0362	-13.6349
4.06.34.04	Pluvialia I.	Isla de la Gomera	14.25	0.00	28.1120	-17.2151
4.06.34.05	Capraria I.	Fuerteventura	12.50	0.00	28.4167	-14.0000
4.06.34.06	Canaria I.	Gran Canaria	11.00	1.00	27.9561	-15.5793
4.06.34.07	Pintuaria I.	Tenerife	10.50	0.00	28.1986	-16.6425

Table 6. Known and tentative locations in Aethiopia Interior.

Ptolemy ID	*Ptolemy Name*	*Modern Name*	*Ptol. Lat.*	*Ptol. Lon.*	*Mod. Lat.*	*Mod. Lon.*
4.07.24.01	Western lake	Lake Albert	-6.00	57.00	1.6006	30.8476
4.07.24.02	Eastern lake	Lake Victoria	-7.00	65.00	-1.0083	32.9873
4.08.06.02	Ion Mts.	Mont No (1070 m)?	-8.42	10.00	7.6492	-7.6987
4.08.06.04	Mesche Mts.	Maisajeh Hill (1593 m)?	-13.00	25.00	10.4031	8.9639
4.08.06.05	Barditus Mts.	Emi Koussi (3415 m), in Tibesti Mts.?	-6.00	45.00	19.7929	18.5512

Table 7. Known and tentative locations in Sinae (plus some in India beyond the Ganges).

Ptolemy ID	*Ptolemy Name*	*Modern Name*	*Ptol. Lat.*	*Ptol. Lon.*	*Mod. Lat.*	*Mod. Lon.*
7.02.08.07	W. end of Semanthinum Mts.	Kakoulima (1011 m)?	33.00	170.00	9.7711	-13.4478
7.02.24.04	Tomara (Tamara)	Tamarâṭ, near Oued Tamarâṭ and 130 km away from Râs Timirist (Cape Timris)	18.00	172.00	20.3913	-15.9036
7.02.30.01	Islands of Satyrs (3)	Ilha de Santiago (Cape Verde, Cabo Verde)?	-2.50	171.00	15.0869	-23.6259
7.03.02.03	Aspitharas R. mouth	near Dâyet Amoûré, an inter-mittent pond near depression Grâret Agoueïfa, in front of Et Tîdra (Tidra) island?	16.00	175.00	19.7437	-16.2702

7.03.02.04	Aspitharas R. sources	Atouila, an intermittent pond near Khaṭṭ Atoui (Uad Atui)?	26.00	180.00	20.1370	-15.4428
7.03.02.06	Bramma city	Nouâmghâr, El Mamghar?	12.50	176.67	19.3564	-16.5139
7.03.02.07	Ambastes R. mouth	near Imbich, a well?	10.00	177.00	18.1738	-16.0197
7.03.02.09	Rhabana city	Nouakchott	8.50	177.00	18.0856	-15.9786
7.03.02.10	Saenos R. mouth	Sénégal Fleuve, River Senegal	6.50	176.33	16.0430	-16.4921
7.03.02.11	Southern Cape	Cap Manuel, *Hanno's Horn of the South*	4.00	175.00	14.6470	-17.4322
7.03.02.13	Cape of Satyrs	Cape Point, Kap Mary?	0.00	175.00	13.4890	-16.6673
7.03.03.03	Cutiaris R. mouth	Gambia R. mouth?	-7.00	177.00	13.4684	-16.5578
7.03.03.07	Cattigara Sina, road-stead	Settra Kru, Setro, former Sestre Crou, in Sinoe county?	-8.50	177.00	4.9001	-8.8441
7.03.05.02	Acathra	Agâda?	21.25	178.33	21.1871	-15.1520
7.03.05.03	Aspithra	Et Tîdra (Tidra)?	16.25	175.50	19.7568	-16.3958
7.03.05.04	Coccoranagara	Conakry?	-2.00	179.00	9.5097	-13.7120
7.03.05.05	Sarata	Kaédi (the former capital of Chieratik or Siratik, the Serer people)?	4.00	180.00	16.1454	-13.4935