Suggested Solutions for Issues Concerning The Location of Mecca in Ptolemy's Geography

Dan Gibson, 2013

Recently Muslim scholars have taken issue with my study of the geography of the Qur'an to claim that the city of Mecca did exist hundreds of years before Muhammad and that it is accurately charted in Ptolemy's Geography which predates the founding of Islam by several centuries. This article will attempt to demonstrate that by using computer modeling it is possible to use Ptolemy's coordinates to locate ancient cities and geographical features in Arabia and that Mecca is not on these maps.. (In this article I will use "AP" (After Ptolemy) to distinguish coordinates used under Ptolemy's system from modern coordinates.)

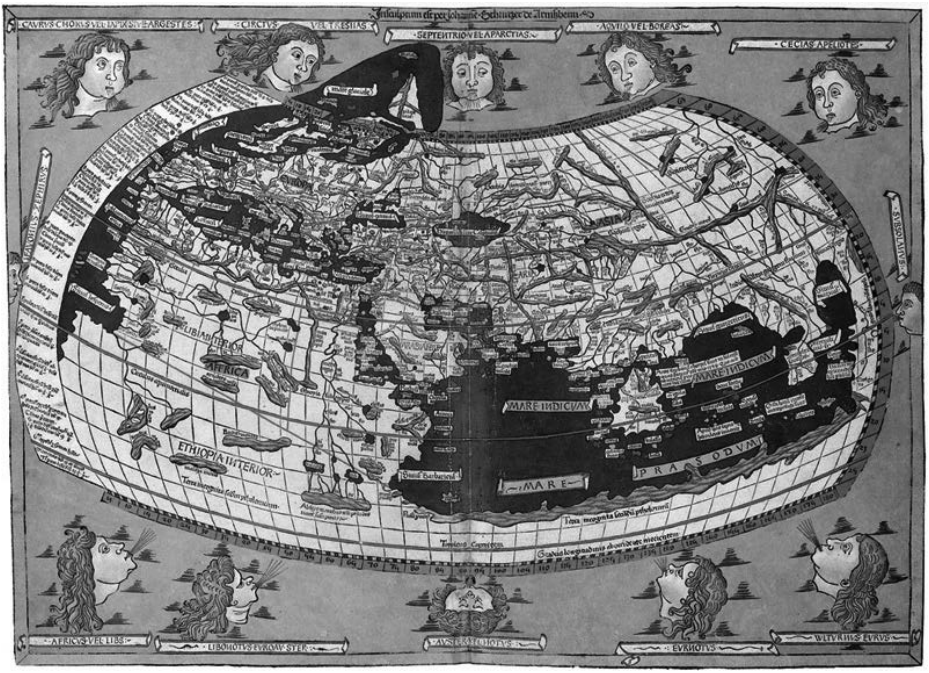
Muslim scholars have claimed that Mecca can be found in Ptolemy's list of places in Arabia, (Arabia Felix Map, Book 6, Chapter VII, Sixth map of Asia) but under another name. Some point to Macoraba (73 20 22 -AP) and some point to Centos village (69 20 21 30 AP) or Thebe town (69 40 21 - AP). In order to answer this we will have to understand something of the system that Ptolemy used, and examine his maps carefully before explaining why these conclusions are faulty.

Three Ancient Systems

For the sake of those who may not be familiar with ancient navigation, several systems of calculation have been used over the centuries by navigators and geographers to provide the positions of cities and other geographical features. The main ones are:

1. Ptolemaeus Claudius (Ptolemy) (90 AD - 168 AD), was a Greek writer who wrote among other things, the *Geography,* which listed latitude and longitude for many cities, mountains and other geographical features known in his day. The *Geography* is composed of eight books with the first volume explaining the method behind his system of coordinates. Volumes II - VII contain lists of locations and their coordinates with the last volume giving the 26 known

regions in his day. (Lennart Berggren and Jones 2000) He wrote in Greek about 150 A.D. during the time that Alexandria was waning as the centre of world learning. As far as we know Ptolemy did not draw a map, but rather plotted his coordinates on a large physical ball or globe. While his globe did not survive the ravages of time, the record of his coordinates survived in the *Geography*. His writings were later lost to the western world, although they were known in the Arab world. Around the beginning of the 15th century his works were rediscovered and translated from Greek into Latin, sparking the idea of a global coordinate system. This revolutionized medieval European geographical thinking. Starting in 1477 until as late as 1596 a large number of two dimensional European maps were drawn to try and replicate the list of places and coordinates that Ptolemy left us from his three dimensional globe. Starting in 1561 Gastaldi and then a host of others began to make corrections to the early maps and eventually maps based on Ptolemy were replaced by more modern maps based on actual physical observation by European explorers who began using the British system of latitude and longitude. (Tibbetts, G.R., *Arabia in Early Maps*, Falcon, Oleander, 1978)



Above: Ptolemy Cosmographia. A map drawn after Ptolemy in 1467. Note the size of Sri Lanka.

2. The Arabic system of *Qiyās* used isba' and taf'īla to measure distances. Locations of places were often given in isba' (The number of fingers measured from the desert or ocean horizon to the pole star when held at arms length) and this system was the basis used for navigational instruments such as the *kamal* and later for the *astrolabe*. While Qiyās lost its popularity during the later Ottoman Empire, it continued to be used by some dhow captains until the 19th century. (Gibson, *Qur'anic Geography,* 2010, pg 335-345) Most descriptions of the science of Qiyās are found in Arabic nautical manuals known as rahmānis (Agius, Dionisius A., *Seafaring in the Arabian Gulf and Oman: People of the Dhow*, 2009). One of the better known manuals is: *Kitāb ma'din al-asrār fi 'ilm al-biḥār* (*The Mine of Secrets in the Science of the Seas*, by Shaikh Nasr bin 'Ali al Haduri). Handwritten copies are still used by some dhow captains today. Under the Qiyās system the world was divided into 224 isba' or degrees.

3. The modern system of latitude and longitude was developed by the British in 1714 and is based from the town of Greenwich in the UK, using 360° degrees of latitude and longitude. Many books are written on the subject.

While there were earlier systems by Eratosthenes in the 3rd century BC and Hipparchus in the 2nd Century BC we will limit our dealings with these three systems: Ptolemy's based on 81° degrees north and south and 360° degrees east and west (of which he tried to map 180° degrees), the Arab system based on 240° degrees around the world, and our modern system based on 360° degrees. As you can see, it will not be easy to simply move data back and forth between these systems.

Rejection of Claudius Ptolemaeus' Geography

Few scholars accept Ptolemy's coordinates as accurate. The value of his coordinates has been contested by many scholars including Heuzey and Daumet (*Mission archéologique de Macédoine*, Paris, 1876, pg 1832); Flensted-Jensen (*The Bottiaians and their Poleis, Studies in the Ancient Greek Polis,* Stuttgart, 1995: pg 1133) and Hatzopoulos and Loukopoulou (*Morrylos cite de la Crestonie*, Athens, 1989: pg 85,); and Karl Müller (*Geography Latin & Greek*, Firmin-Didot, 1883, pg 5184.) Here are a few of the reasons:

1. Ptolemy calculated the circumference of the earth as 28,985 kilometers (18,000 miles), a massive error that offset his calculations by nearly 28 percent and his circumference was used in Europe until the Renaissance. Latitude was

measured from the equator, as it is today, but Ptolemy expressed it as the length of the longest day rather than degrees of an arc. He used the length of the midsummer day which increases from 12h to 24h as one moves from the equator to the polar circle). His system allowed for 81° degrees from deep in Africa to the Arctic. He then put the meridian of 0° longitude at the most western land he knew, the Canary Islands, and the farthest east (180° degrees) as "Serica" and "Sinae" (China), "Taprobane" or Sri Lanka and the "Aurea Chersonesus" or (Southeast Asian peninsula). Since Ptolemy's diameter of the earth was too small, all of his positions need to be recalculated. The small circumference of the earth was perhaps one of the major reasons why Columbus thought he could easily sail across the Atlantic to China.

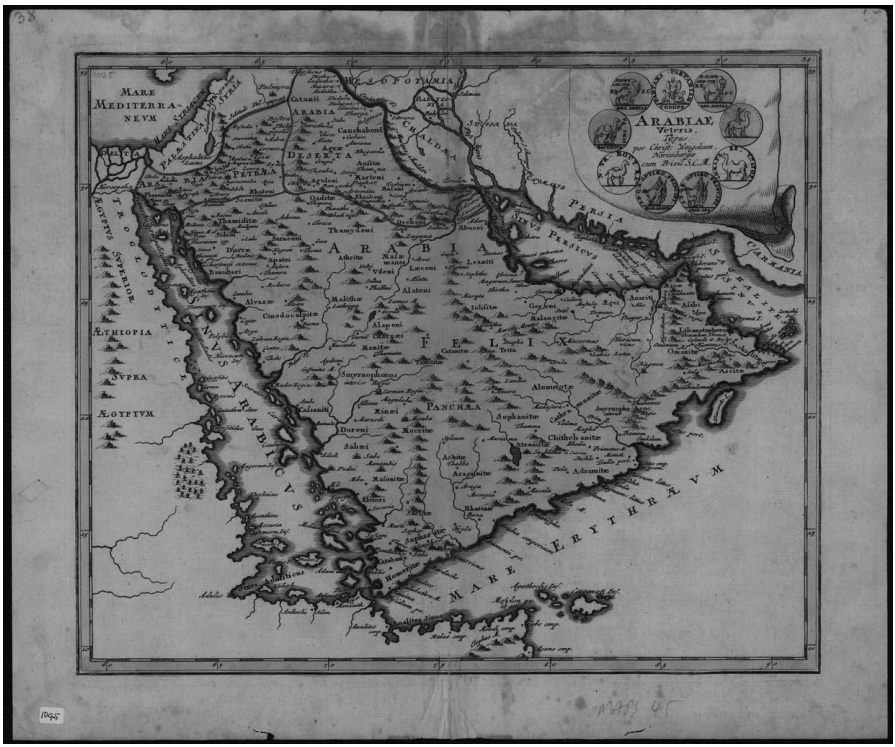
2. Since Ptolemy never visited most of the sites listed in the *Geography*, he had to rely on merchants to provide descriptions. Many of the places he mentions were plotted poorly because of this, and Ptolemy seldom gave exact location, rounding some places to the nearest degree.

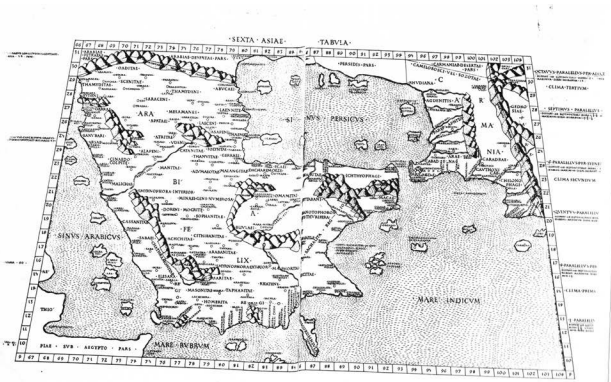
3. Mistakes or inventions told to him by merchants and travelers became standard features on future European maps based on Ptolemy. Rivers in Arabia are an example. Ptolemy, who was desperate for descriptions of every place in the world garnered his information from whomever he could find who had some knowledge of distant places. Sometimes this information was misleading, sometimes fanciful or simply wrong.

4. Many of the names Ptolemy lists are obscured because they are written as the Greeks knew them or heard them, not as they might have been called in their original language, such as Arabic in the Middle East. Charles Forester comments:

> "*The modulation, for the sake of euphony of some Arabic consonants by the Greeks and Romans, for example, the substitution of the Greek theta for the Arabic Dal, as Thamata for Dama, Thabba for Dahban, Theba for Teba or Deba, Thauane for Doan: of the s, and t, for d, as Saphar for Dafar, Tamala for Al Demlou: of the s for z, as Sibi or Sesippi portus for Zebid: of the Greek phi for the Arabic ba, as Sapphar for Sabber: of the n for l, The Arabic termination in for the Hebrew el, is not an unusual change...*" (Forester, Charles, *The Historical Geography of Arabia, Volume 1*, Duncan and Malcolm, MDCCCXLIV, Introduction, page LX-LXII)

5. Map makers have long had difficulties placing locations on Ptolemy's maps. Each of the maps produced from Ptolemy's coordinates looked different. Notice the difference between the two maps below, as the mapmakers also incorporated knowledge and perspective common in their era.





Above: Map by Christoph Weigel, 1720, shows Arabia Felix, Arabia Deserta, and Arabia Petraea. Other regions included are Palestine, Mesopotamia, Chaldea, Persia, Aegyptus, and Aethiopia.

Left:
Sexta Asiae Tabula Details V

6. It is common for people to simply look at the maps drawn in the fifteenth century and imagine which names match modern names, rather than comparing names, descriptions and the degrees of latitude and longitude used by Ptolemy to understand what he was referring to.

While it is tempting to simply dismiss Ptolemy`s *Geography* as being inaccurate, if one studies his system it becomes apparent that he was amazingly accurate within the Greek and Roman world and less accurate when locating places farther away. In this study we will concern ourselves mostly with Ptolemy`s maps of Felix Arabia, but in order to understand his system, we will have to examine other locations and develop a computerized model and mathematical algorithm that will allow us to translate data from Ptrolemy`s Geography into modern latitude and longitude.

Early in this process we must understand that Ptolemy's latitude is quite stable and never exceed -3° to +2° differences, and for the actual territory of Greece the latitude differences varies from -1° to 1°. When we study longitude however, the coordinates given by Ptolemy with their actual counterparts shows an increasing trend of longitude differences eastwards (Livieratos 2006:165). From about 14.5° at the "Columns of Heracles" to about 26.5° at the area of Aegae and around 32° at the east coast of Cyprus. (Manoledakis, Manolis and Livieratos, Evangelos, 2007). This means that Ptolemy slowly stretched his map out towards the east.

Ptolemy's Roman View of Arabia

The Romans divided Arabia into three parts: Arabia Petraea (the Roman province ruled from Petra), Arabia Deserta (the desert area of Arabia east and below the Roman Empire) and Arabia Felix (Happy Arabia) which is the incense producing land of Yemen and Oman and the southern part of Saudi Arabia, (Najran, Jazzan etc). (See *http://nabataea.net/arabia.html* for more information)

This is important, because Ptolemy divided his descriptions of Arabia into three separate maps, one for each of these areas. As we will demonstrate he did a decent job of the Roman province of Petraea, because it was under Roman control and he could speak to people who were very familiar with that region. He also spent a lot of time listing places on the Arabia Felix map, as incense was very important to the Romans and this was a land of fabled riches. As we will demonstrate, in doing so his Arabia Felix became larger than it should have been, and the desert map was squeezed into a much smaller area. In fact, Ptolemy only lists 25 places between Arabia Petrea and Arabia Felix on his Deserta map and over 200 places on his Arabia Felix map.

Rivers in Arabia

One of the problems in trying to equate Mecca with Macoraba, Centos or Thebe is the existence of the Betius River (69.30-20.40 AP). In the Geography, Ptolemy clearly locates several large rivers in Arabia, a problem for modern geographers, as no active rivers exist today in the Arabian Peninsula. But Ptolemy clearly marks the mouth of this river on the Arabian coast, (just south of Thebe) as well as rivers running into the Indian Ocean and one running into the Persian Gulf. The existence of these rivers have cast some doubt on the accuracy of Ptolemy's maps. However, when reconstructing Ptolemy's coordinates, these three rivers become increasingly important. Over time the names of cities and villages change and ruins crumble and disappear, but river courses, while they may change slightly, are long lasting. Even though water may not flow year round, or perhaps even at all, the existence of the ancient river courses help provide us with several solid coordinates that we can use to bridge between Ptolemy and the globe as we know it today.

On the map to the right the Betius River is clearly marked just south of Centos and Thebe. Ptolemy clearly marks these places as coastal locations, not inland as some have imagined. Ptolemy provides two lists of names in the Geography, those on the coast and those inland. Macoraba is listed as a location on the inland list while Centos and Thebe are clearly listed as coastal locations. (See page 16 & 18) If we are going to locate these cities, we must understand where the Betius River is located.

Those supporting the argument that Macoraba, Centos or Thebe are old names for Mecca have suggested that perhaps a river did exist there in antiquity near Mecca, but this does not seem to be the case when examining the Periplus Maris Erythraei which makes no reference to a river or ports along the central Arabian coast.

Directly below this place is the adjoining country of Arabia, in its length bordering a great distance on the Erythraean Sea. Different tribes inhabit the country, differing in their speech, some partially, and some altogether. The land next the sea is similarly dotted here and there with caves of the Fish-Eaters, but the country inland is peopled by rascally men speaking two languages, who live in villages and nomadic camps, by whom those sailing off the middle course are plundered, and those surviving shipwrecks are taken for slaves. And so they too are continually taken prisoners by the

chiefs and kings of Arabia; and they are called Carnaites. Navigation is dangerous along this whole coast of Arabia, which is without harbors, with bad anchorages, foul, inaccessible because of breakers and rocks, and terrible in every way. (Casson)

This account was written during the first century AD shortly before Ptolemy, and no river is mentioned, even though the author goes on to give other navigational aids before reaching Muza.

The Betius River appeared on all of the maps styled by Ptolemy until modern map makers realized that the river is not in the correct location. As we will demonstrate, Ptolemy imagined Arabia Felix to be larger than it was, and so he located it too far north. If we look farther south, the most likely geographical feature that could possibly be the Betius River is Wadi Mawr which descends from the mountains of Yemen to Al Luhayyah (15°42'21.99"N and 42°58'24.74"E) on the Red Sea coast. The satellite photo below shows the flow of water from the mountains towards the coast.

The Tihama is the broad flat stretch of sand that separates the mountains of Arabia from the sea coast. Wadi Mawr flows through a clearly identified river bed across this sandy area and empties into the Red Sea near the ancient town of Al Luhayyah.

Right: When it rains in the mountains, water flowing in Mawr Wadi enters into the ocean at Al Luhayyah making appear as if it is a river.

Just below the river and in the interior Ptolemy tells us, is the region of Sabaei or Saba and the Myrrifera region, which would refer to the incense (Myrrh) grown in that region. This helps us confirm that the Betius River is Wadi Mawr, as it is located just north of the Saba region. I personally traveled all through this area in the 1980s, and without using Ptolemy's lines of latitude and longitude would have assumed from Ptolemy's map that the area he was addressing was in Yemen and not farther north in Saudi Arabia. This is supported by the islands drawn along the coast. These are clearly labeled by Ptolemy, and seem to be the collection of islands off of Jazan some 500 kilometers south of Mecca and Jeddah near Wadi Mawr. Thus the Zabram region on Ptolemy's map is most likely the Tihama region along the coast, and Thebe town would have been Al Luhayyah.

Ptolemy identifies the mouth of the Prionis River at 85. 3.30 AP. This flowed into the Indian Ocean. A good suggestion is Wadi Dhahawn in Yemen, which emerges at the town of Al Ghaydah. (16°12'16.24"N and 52°14'18.73"E).

Left: Wadi Dhahawn flows east into the Indian Ocean at the town of Al Ghaydah in Yemen.

Ptolemy lists the Hormanus River (89.30 20.30 AP) as flowing into the Indian Ocean. Today this would most probably correspond to Wadi Bani Khalid which flows through the mountains and eventually into the Red Sea near Al Jumaylah (22° 0'2.35"N and 59°39'19.39"E) in Oman.

Ptolemy identifies the mouth of the Laris River (86.30 23.30 AP) as being on the north side of Arabia flowing into the Persian Gulf. Today all that is left of this river is the waterway known as the Dubai Creek. (25°14'1.76"N and 55°20'13.34"E)

Modern terraforming has changed the coastline considerably, but the Dubai Creek remains clearly visible in satellite photos.

There are a number of city location on Ptolemy's map which are well known today. He correctly identifies the Yemeni ports of Muza, Aden (Emporiu Arabia), and Cane. This provides us with four rivers and three coastal cities that we can identify today.

Above: The Wadi Bani Khalid in Oman matches the Hormous River of Ptolemy.

Above: The remains of the Laris River in the center of Dubai, U.A.E.

Mouth of the Betius River	(69.30	20.40	AP)
Mouth of the Hormanus River	(89.30	20.30	AP)
Mouth of the Prionis River	(85.	13.30	AP)
Mouth of the Laris River	(86.30	23.30	AP)
Cana Market town (Al Mukalla)	(84.	11.30	AP)
Arabia Market Town (Aden)	(80.	11.30	AP)
Muza Market Town	(74.30	14	AP)

Finding Modern Locations on Ptolemy's Map

Since Ptolemy used a graduated set of measurements based on the length of days, his degrees are not the same as we would use today. Today, we start at 0° at the equator and 90° at the pole. The Arctic Circle is 66°.5622. Ptolemy started at 0° at the equator and 81° at the Arctic Circle, thus he had more degrees in his arc than we have today. You cannot simply move from one system to the other by adding 2°35' as some have tried. Added to this, he allowed for only 81 degrees from the equator to the North Pole. This means we cannot move data easily from one map to the other. In order to find places on Ptolemy's map, we must calculate latitude and longitude separately, as they are two separate scales, one with 81° degrees and the other with 180 degrees.

As we stated Ptolemy's latitude never exceed -3° to +2° differences, and for the actual territory of Greece the latitude differences varies from -1° to 1°. However, the longitude coordinates given by Ptolemy shows an increasing trend of longitude differences eastwards. From about 14.5° at the "Columns of Heracles" to about 32° at the east coast of Cyprus. (Livieratos 2006:165) (Manoledakis ,Manolis and Livieratos, Evangelos, 2007)

For the purposes of our study we developed a formula that allows us to convert modern latitude and longitude coordinates into Ptolemy's system, allowing us to check the existence of known ruins on Ptolemy's maps. In order to make the conversion, we use two formulae one each for latitude and longitude.

Latitude: $E_p = 24.9198 + 1.183E$

Longitude: $N_p = -1.43284 + 1.04134N$

We then matched up well known locations on Ptolemy's map with modern locations to check our formulas. Notice that Ptolemy provides the longitude first, and then the latitude.

Place Name	Ptolemy	Longitude	Latidude
Gaza	65 25 31 45 AP	31°31'31.36"N	34°25'54.97"E
Berenice	64 5 23 50 AP	23°56'46.39"N	35°29'39.26"E
Myoshormus	64 15 26 45 AP	26° 5'58.45 "N	34°17' 6.05"E
Babylon	62 15 30 AP	32°32' 11 "N	44°25' 15 " E
Heliopolis	62 30 29 50 AP	30°07' 46.3 "N	31°17' 20 " E
Ephesus	57 10 37 40 AP	37°57' 6.11 "N	27°22'28.93"E
Sidon	67 10 33 20 AP	33°33'50.01"N	35°22' 6.83"E
Damascus	69 - 33 - AP	33°30'56.85"N	36°18' 7.91"E

Palmyra	71 30 24 - AP	34°33' 36 "N 38°16' 2 "E
Petra	66 45 30 20 AP	30°19'35.69"N 35°26'2.52 "E
Muza	74 30 14 - AP	13°19'21.49"N 43°15'2.72 "E
Cana	84 - 11 30 AP	14°31'59.32"N 49° 7'31.62"E
Derbe	64 20 38 15 AP	37°26'20 "N 33°09' 50 "E
Tarsus	67 40 36 50 AP	36°55'00 "N 34°53' 44 "E
Caesarea	68 30 37 - AP	32°30'08.08"N 34°54'30.33"E
Salamis, Cyprus	66 40 35 20 AP	35°11' "N 33°54 "E
Laodicea	68 30 35 5 AP	37° 50' 9 "N, 29° 6' 27 "E
Ascalon	65 - 31 40 AP	31° 40' 0 "N, 34° 34' 0 "E
Elusa	65 10 30 50 AP	31° 5' 49.2 "N 34° 39' 7.2 "E
Madaba	68 30 30 45 AP	31° 43' 0 "N 35° 48' 0 "E

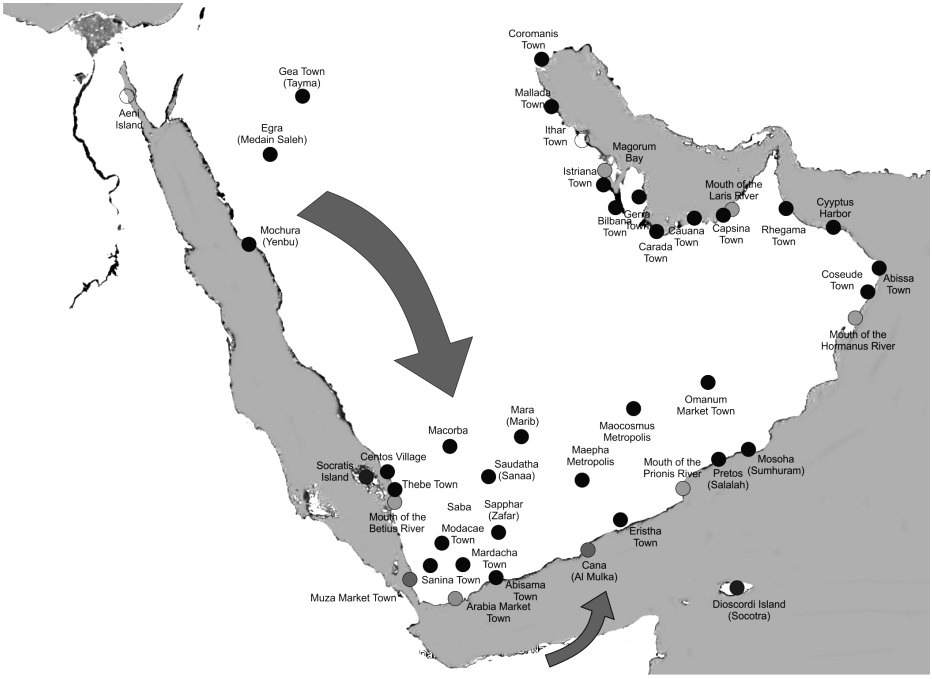
While this was a working solution for the Roman parts of Ptolemy's map, we struggled to match locations throughout Arabia Felix. We then decided to place Ptolemy's coordinates on a grid without any reference to any maps. Then we would try and match the rivers to see what Ptolemy had done.

Above: A chart of places in Arabia Felix according to Ptolemy's coordinates.

When we attempted to overlay these coordinates on a modern map many problems arose when trying to fit them correctly. (See below)

The solution to this was to manipulate Ptolemy's coordinates until the rivers lined up. In order to do this we left three places on Ptolemy's map in the north. Egra (Hegra), known as Mada'in Saleh today, Gea Town which aligned with ancient Tayma, and Mochura which remains on the coast where Yenbu is. We then grouped the Beitius River and the other locations near to it and move them all southward until the Betius River was over Wadi Mawr. (The other grouped locations also moved southward. When we do this, many of the interior locations suddenly becomes apparent. In short, we matching Ptolemy's Rivers to the location of the rivers today to obtain a correct map of Arabia. In doing so it became apparent that Ptolemy was not aware of the vastness of the deserts in Arabia's interior, and that he plotted the locations in Yemen too far north.

Once w had shrunk Ptolemy's map southward (with a small twist on the bottom to correct Ptolemy's angle) many of the locations on Ptolemy's map suddenly fit. Ptolomey's Centros Village becomes modern day Jazan, Thebe Town becomes Al Luhayyah and Macorba becomes Al-Mahabishah. Mara is then positioned above Ma'rib and Saudatha becomes modern day Sana'a. Sapphar then fits over Zafar etc. On the Indian Ocean coast Petros becomes modern day Salalah and Mosoha is what we know today as ancient Sumhuram.



How can we find Mecca on Ptolemy's Maps?

As we stated earlier, in Ptolemy's mind, Arabia Felix was much larger than we know it today. The same thing happens on his map of Sri Lanka, where the island is much larger that it should be. This is because Roman and Arab ships traveled to Palk Bay on the north side of Sri Lanka to trade with Chinese and other Asian boats. Thus Sri Lanka was of major importance, and so it grew in size in Ptolemy's mind and as a result on his maps as well.

When we adjust Ptolemy's maps according to river locations, his city coordinates suddenly make more sense. Obviouisly Ptolemy grossly underestimated the size of the Nafud Desert and allowed the locations on his map to drift northward to fill in the void. From this corrected map we can easily discern what Ptolemy intended, and we can also be quite safe in concluding that Mecca and Medina did not appear on Ptolemy's map. This would be in keeping with the archeological records that shows that Medina was not settled as an urban area until the breaking of the Ma'rib Dam between 542 and 570 AD AD (Gibson, 2010:216) and that Mecca was not settled as a city until around 900 AD.

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Addendum
Ptolemy's Geography: Three Maps of Arabia

Book 6, Chapter VII
Location of Arabia Felix
(Sixth Map of Arabia)

Arabia Felix is terminated on the north by the designated border of Arabia Petraea and of Arabia Deserta; on the northeast by a part of the Persian Gulf; on the west by the Arabian Gulf; on the south by the Red Sea, on the east by that part of the Persian Gulf and the sea, which extends from the entrance to this gulf as far as the Syagros Promontory. The maritime coast of this region is thus described; from the terminus of the Arabian Gulf near the Elanite bay.

The Arabian Gulf:		
Omne	66.20	28.50
Modiana	66.40	27.45
Hippos Mountains	66.30	27.20
Hippos Village	67.	26.40
Phoenicum Village	67.20	26.20
Raunathi Village	67.15	25.40
Chersonesus Promontory	67.	25.40
Iambia Village	68.	24.

The Thamyditae inhabit the upper shore of this Gulf, and then the Sideni, then the Darrae, next to these the Banubari; then the Arsae.

Cinaedocolpite Region		
Copar village	68.30	23.25
Arga Village	69	22.40
Zabram Region	69.20	22.
Centos Village	69.20	21.30
Thebe Town	69.40	21.
Mouth of the Betius River	69.30	20.40
River sources	76.	24.30
Cassanita Region		
Badeo Regia	70.	20.15
Amba Town	70.40	19.30
Mamala Village	71.45	18.10
Adedi Village	72.15	17.10
Elesara Region		
Pudni Town	72.30	16,30
Eli Village	73.30	16.30
Napegus Village	73.30	15.
Sacatia town	74.15	14.30
Muza Market Town	74.30	14.
Sosippi port	74.45	13.
Pseudocelis	75.	12.30
Ocelis market town	75.	12.
Palindromus Promontory	74.30	11.40
On the strait entering the Red Sea		
Posidium promontory	75.	11.30
Sanina town	75.30	11.45
Cabubathra Mountains	76.15	11.15
Homerita region		
Modocae town	77.	11.45
Mardacha town	78.	11.45
Lees vilvage	78.40	11.30
Ammonium Promontory	79.20	11.10
Arabia Market town	80.	11.30
Agmanispha village	80.40	11.45
Niger Mountains	81.30	11.45
Atramita Region		
Abisama town	82.	11.45
Magnum coast (littus)	82.30	11.30
Mada village	83.	11.30
Eristha town	83.30	11.45
Parvum coast (littus)	83.40	11.30
Cana Market town & Promontory	84.	11.30
Trulla harbor	84.	11.30
Maethath village	84.	12.40
Prionotus Mountains	84.40	13.
Mouth of Prionis River	85.	13.30
River Sources	82.	17.30
Embolium Village	85.30	13.20
Pretos Harbor	86.20	13.45
Thialemath village	87.	14.
Mosoha harbor	88.30	14.
Syagros Promontory	90.	14.
Sachalitarum in Sachalite bay		
Metacum village	88.	16.
Ausara Village	87.20	16.45
Anga Village	87.30	17.30
Astoa Village	88.30	18.30
Neogilla Naval Station	89.	19.
Mouth of Hormanus River	89.30	20.30
Didyma Mountains	90.15	19.20
Coseude Town	91.	20.

Oracle of Diana	91.40	20.
Abissa Town	92.20	20.15
Corodamum Promontory	93.	20.15
At the Entrance to the Persian Gulf		
Cyyptus Harbor	92.40	21.30
Melanes mountains which are called Asabon, the middle part of which is located near the sea	93.	22.
Asabon Promontory	92.30	23.30
Persian Gulf		
In the widely extended bay of the Ichthyophagi near which toward the interior, are the Macae; then the towns of the Anaritae:		
Rhegama Town	88.	23.10
Sacrum Sun Promontory	87.20	23.20
Mouth of Laris River	86.30	23.30
Rive sources	81.	18.
Capsina Town	86.	23.10
Cauana town	85.	23.
Then of the Egei		
Sarcoa town	84.15	23.
Carada town	83.40	23.30
Atta Village	82.	23.15
Then of the Gerraei		
Magindanata town	81.	23.20
Gerra town	80.	23.20
Bilbana town	80.	24.10
Then of the Thaemi		
Ithar town	80.	25.
Magorum bay	80.	25.20
Istriana town	80.	25.40
Then of the Laenitae		
Mallada town	80.10	26.10
Chersonesus promontory	80.20	26.30
Leantes Bay	70.15	27.
Itamos Harbour	79.15	27.40
Then of the Abecei		
Sacer Bay	78.15	28.15
Coromanis town	79.	28.45
Next the terminus on the confines of the desert and Mesanites bay	79.	3 0.10

The noted mountains of this land are those which we have mentioned towards the interior which are called the Zames, the middle part of which is located in 76. 25.

The Mrithi Mountains	80.	21.10
The Climax mountains	76.30	16.
Near which mountains is the fountain of the Stygian waters	78.	15.
Other mountains wanting names		
Above Cinaedocolpitae	71.	25.
Above Cassanitae	73.	20.
Below Marithos mountains	84.30	17.40
Above Asabon mountains	88.	22.30

The Scenitae dwell in the interior near that part towards the north which is entirely mountainous; above are the Oaditae; toward the wouth from these are the Saraceni and the Thamydeni; then around the Zames mountains and towards the west from this are the Apataei and the Atritae and near these the Mesamanes and the Udeni; toward the east are the Laeeni, the Asapeni and the Iolysitae; to the south are the Catanitae, then the Thanuitae; from these towards the west the Manitae, above whom are the Alapeni, and near Cinaedopolita the Malichae. And below the Manitae is the Smyrnofera interior region; then the Minaei, a numerous race, below whom are the Doreni and the Mocritae; then the Sabaie and the Anchitae above the Climax mountains; around the Marithos mountains are the Malangitae to the north, and the Dachareni, the Zeiritae, then to the south the Bliulaei and the Omamitae, from whom the river source are the Cottabani as far as the Asabon mountain, below whom is the Libanotofora region; then near the Sachalita region are the Iobaritae; below the Gerraei are the Alemaeotae and extending as far as Climax mountains the Arabanitae; below all these the Chatramonitae from the Climax mountains even to Sachalitas; toward the south from the Climax are the Masonitae; then the Asaritae and near Homerita the Sappharitae and the Ratheni, above whom are the Maphoritae, thence to the beginning near the Chatramonitae is the Smyrnofera exterior region; near Syagrum as far as the sea are the Ascitae.

The towns and villages which are in Arabia Felix in the interior are the following:

Aramava	67.30	29.10
Ostama	69.30	29.
Thapava	71.40	29.
Macna	67.	28.45
Angala	68.15	28.45
Madiama	68.	28.15
Achrona	70.	28.15
Obraca	71.30	28.20
Rhadi village	73.30	28.30
Pharatha	73.40	28.40
Satula	77.30	28.19
Laba	68.10	27.40
Thaema	71.	27.
Gea Town	71.15	27.20
Aina	75.40	27,20
Lugana	76.30	27.15
Gaesa	78.40	27,15
Siaca	68.	26,15
Egra	70.30	26.
Salma	74.30	26.
Arra Village	75.40	26.10
Digema	77.	26.30
Saptha	78.15	26.20
Phigea	79.	26.
Badais	68.30	25.30
Ausara	71.	25.30
Iabri	74.30	25.
Alata	77.20	24.30
Mochura	69.40	24.30
Thumna	71.10	24.50
Alvara	71.	24.15
Phalibinum	73.15	24.
Salama	73.20	24.20
Gorda	76.10	24.30
Marata	79.20	24.20
Ibirtha	79.40	24.40
Lathrippa	71.40	23.20
Carna	73.30	23.15
Biavanna	76.30	23.
Goeratha	77.40	23.
Catara	79.30	23.20
Baeba	71.30	22.30
Macoraba	73.20	22.
Sata	81.10	22.30
Masthala	81.45	22.30
Domana	82.20	22.30
Atia	85.	22.15
Ravana Regia	87.	22.
Chabuata	89.15	22.
Thumata	74.20	21.20
Olaphia	77.40	21.45
Inapha	79.10	21.40
Triagar	85.	21.20
Aspa	91.	21.
Agdamum	73.30	20.20
Carman Regia	75.15	20.15
Irala	80.20	20.15
Maocosmus Metropolis	81.15	20.40
Labris	81.	20.15
Lattha	83.20	20.15
Accipitrum Village	84.30	20.30
Albana	71.30	19.15
Chargatha	73.10	19.15
Omanum Market town	87.40	19.45
Marasdu	74.20	18.20
Mara Metropolis	76.	18.40
Iula	85.20	18.15
Magulaba	75.30	17.
Sileum	76.30	17.
Mariama	78.10	17.10
Thumna	79.	17.15
Vodona	89.	17.20
Marimatha	85.10	17.40
Saba	73.40	16.55
Menambis	75.45	16.30
Thauba	78.40	16.10
Saudatha metropolis	77.	16.30
Madasara	81.45	16.20
Gorda	82.30	16.
Thabane	85.40	16.20
Miba	74.20	15.20
Source of Stygia Water	78.	15.
Draga	79.10	15.15
Sarvon	80.40	15.15
Maepha Metropolis	83.15	15.
Saraca	75.30	14.30
Sapphar Metropolis	78.	14.
Ara Regia	80.30	14.30
Rhaeda	83.30	14.10
Baenun	8.30	14.15
Thuris	75.15	13.
Lachchera	77.30	13.20
Hyaela	79.	13.50
Maccala	81.	13.45
Sachla	82.40	13.20
Sava Regia	76.	12.
Deva	77.40	12.45
Sochchor	78.30	12.40
Bana	80.20	12.40
Dela	82.	12.40
Coa	83.30	12.30

Island adjacent to this region and those which are in the Arabian Gulf are:

Aeni	65.45	27.20
Timagenis	66.	25.45
Zygena	66.15	24.20
Daemonum	66.45	23.15
Polybii	67.40	27.40
Accipitrum	69.30	19.
Socratis	70.	16.40
Cardamine	71.	16.
Are	71.30	15.20
Combustqa	70.30	14.30
Malicha II	71.40	14.
Adani Duae	72.30	12.30

In the Red Sea

Agathoclis II	81.20	10.
Cocconati III	83.	9.
the middle of which		
Town of Dioscordi island	86.40	9.30
terminus of western island	85.	10.30
Trete	86.30	12.

and near Sachalites bay,

the Zenobi VII islands		
the middle of which is	91.	16.30
Organa	92.	19.
Sarapidis, in which is a temple		
in the Persian Gulf	94.	17.30
Apphana Island	81.20	28.40
Ichara	82.	25.
Tharo	85.15	24.45
Tylus	90.	24.40
Arathos	91.40	24.40

Book 5, Chapter XVI
Location of Arab Patraea
(Fourth map of Asia)

Arabia Petraea is terminated on the west by that part of Egypt to which we have referred; on the north by Palestina or Judaea and the part of Syria along the line which we have indicated as its southern border; on the south by the bend of the Arabian bay and by the Heroopolites bay to the terminus as indicaged on the confines of Egypt near the Pharan promontory which is located in 65 28.30 and by the bay, which is the Elanite to its turn which is in 66 29 the position of the village Pharan is 65 28.40. The village Elana which is located in the angle of a bay of this name, has this position 65.50 29.15 on the east its boundary is the line leading to the eastern terminus of Syria, we have indicated, and very near Arabia Felix, to the part of this line which is in 70 30.30 along the Arabia Deserta and the remaining part of the line.

The mountains in this land called Melanes (Niger) extend from that angle of the bay which is near Pharan toward Judaea. From these mountains toward the west along Egypt is Saracene; below this Munychiatis; below which on the bay is the Pharanita region; near the mountains of Arabia Felix are the Raitheni.

The towns and villages in the in interior are:

Eboda	65.15	30.30
Maliattha	65.45	30.30
Calguia	66.20	30.30
Lysa	65.50	30.15
Gubba	65.50	30.
Gypsaria	65.40	29.45
Gerasa	65.30	29.30
Petra	66.45	30.20
Characmoba	66.10	30.
Auara	66.10	29.40
Zanaatha	66.45	29.50
Adru	67.	29.55
Zoara	67.20	30.30
Thoana	67.30	30.30
Necla	67.30	30.15
Cletharrho	67.50	30.20
Moca	67.50	30.10
Esbuta	68.30	31.
Ziza	68.45	31.
Maguza	68.	30.45
Medaba	68.30	30.45
Lydia	69.	30.40
Rabatbmoba	68.30	30.30
Anitha	68.40	30.15
Surattha	69.15	31.10
Bostra legion III Cyreniac	69.45	31.30
Mesada	69.20	30.30
Adra	69.40	30.40
Corace	68.	30. 5

Book 5, Chapter XVIII
Location of the Arabia Deserta
(Fourth map of Asia)

Arabia Deserta is terminated on the north by the part of Mesopotamia which borders on the Euphrates river as we have noted; on the west by a part of Syria and of Arabia Petraea, on the east by Babylonia separated by these mountains which begin at the terminus as we have indicated near the Euphrates river extending to the interior bend of the Persian gulf near the bay, the location of which terminus is in 79 30 10 and that part of the Persian gulf to the terminus, the location of which is 79 29 on the south moreover by Arabia Felix terminating in the confines of Arabia Petraea which we have indicated as being near the Persian Gulf.

The Cauchabeni inhabit the parts of Arabia Deserta which are near the Euphrates river, the Batanaei the parts near Syria, the Agubeni the parts which are near \Arabia Felix, next to these are the Rhaabeni, and the Orcheni on the short of the Persian Gulf; the Aesitae inhabit the parts near Babylonia and the parts which are below the Cauchabeni, and above the Rhaabeni the Musani; in the interior moreover are the Agaei near the Batanaei, and the Marteni near Babylon.

The towns and villages in this land in that near the Euphrates River are:

Thapsacus	73.30	35.5
Birtha	73.40	35.
Gadirtha	73.50	34.45
Auzara	74.5	34.30
Audattha	74.15	34.20
Addara	74.20	34.10
Balagaea	75.	34.
Pharga	75.40	34.
Colarina	75.30	33.40

In the parts near the Persian Gulf are the towns:

Ammaea	79.	30.10
Idicara	79.	29.30
Lucara	79.	29.15

The inland towns are:

Barathena	73.20	33.
Save	73.	33.
Choce	72.30	32. 30
Gauara	73.40	32.40
Aurana	73.15	32.20
Alata	72.30	32.
Erupa	72.30	31.15
Themme	75.	31.40
Luma	75.40	31.
Thauba	72.45	30.0
Sevia	73.30	30.30
Dapha	74.15	30.30
Sora	75.	30.20
Odagana	76.15	30.40
Tedium	77.	30.30
Zagmais	76.30	30.10
Arrade	71.30	30.15
Obaera	71.	30.45
Artemita	72.15	30 10
Banatha	73.15	29.40
Dumaetha	75.	29.49
Bere	76.40	29.30
Calathua	77.30	29 30
Salma	78.20	29.30