cgPl2—MARCUS VIPSANIUS AGRIPPA—HIS MAP

GAIUS PLINIUS SECUNDUS—HIS TEXT

ABSTRACT

Marcus Vipsanius Agrippa was tasked with the production of a map, not a map of the Roman Empire c20BCE, but a map of the whole known world.

Pliny the Elder wrote his reference work, "Natural History" c77CE, well after the death of Agrippa in 12BCE. But, Pliny obviously viewed the finished map which had been erected or displayed in a public area, the Porticus Vipsania.

The source of the geographical data within Pliny's text is mostly attributed to Agrippa and appears to come from the commentary written to accompany the world map.

Thus by extracting the data attributable to Agrippa for geographical, and then the astronomical/astrological facts contained within Pliny's text, we can unravel the dubious extant reconstructions of the past and indicate hitherto un-researched facets of the text.

This has enabled a new interpretation of those facts to be made, and thus the possibility to describe and draw a map more akin to the original by Agrippa.

The previous text, **cgPl1**, contains much of the research for this text. It has not been repeated, merely referenced.

This paper contains 17 A4 pages of text and 24 A4 full colour diagrams.

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SYNOPSIS

The text within Pliny's "Natural History", Book 6, Chapter 39, entitled"Divisions of the earth into Parallels and Shadows of equal length," discusses the lines or segments which divide the world; Roman Circles and Greek Parallels.

However, at first glance the Latitudes and Climates of equinoctial hours do not agree, nor are they regular in their subdivision, but a mis-match of alignments.

Under the 6th division we are informed of one "Nigidius" who was in fact an astrologer and thus the subject of the heavens and the stars with their influence upon the earth in one very striking manner must be researched if we are to unravel the incredible vagaries that are contained within Book 6, Chapter 39.

BACKGROUND

It was the ancient Greeks who commenced investigating scientific matters in a logical and progressive manner. They had the preparatory works of the Mesopotamians,

Babylonians, Chaldeans etc, but, enhanced the research into mathematics, geometry, geography, poetry, music and of course the written word.

Their geographers speculated upon the form of the earth and indeed correctly identified the earth as a globe in a sun-centred universe. The fact that the earth was tilted in its plane of travel and there was a slight wobble in its tilt led to the ecliptic and precession being defined. Many of the astronomical and astrological phenomena first explained by the Babylonians etc were used to expand their knowledge and gradually filled the night sky with the Heroes and fantastic animals we now discuss when viewing the star clusters.

Then the Romans arrived, very different peoples who, whilst appreciating Greek philosophy, learning and technical ability endeavoured to become their betters in many fields. But, thanks to the Roman acceptance of other cultures, religions and use of their technical knowledge, Greek methodology was maintained alongside the Roman and enhanced in the one field most interesting to us, Cartography.

EQUATOR OR ECLIPTIC Diagrams cgPl2D01 and cgPl2D02

Perhaps the first Greek geographer to teach the doctrine of the Earth as a sphere was "THALES" c640BCE. He also clearly stated that the equator of the earth was cut by the line of the earth's orbit against the background stars, the Ecliptic.

However, astronomy had been developed in the Mesopotamian region and inscriptions from there found on clay tablets, plus texts from the Egyptian Temples and Pyramids of the same era are evidence of those astronomical cultures from before c3000BCE. Indeed at Denderah on the River Nile, within one of the roof chapels dedicated to Osiris and his resurrection, the ceiling had a unique Zodiac. Unfortunately it was removed by French collectors in 1800CE, is now in the Louvre, but has been replaced by a plaster cast.

Thus the stars and their given names and property's were very important to these civilisations including the Romans.

These civilisations noted that as the Earth travelled through space circumnavigating the Sun certain star formations were repeatedly observed year by year. The Babylonians had already divided the circle into 360 divisions or degrees and their sexagesimal system allowed for the 12 major star formations to be determined upon the Earth's circuit of the Sun. This led to the band of stars having not only a circular dimension, but, also a band width either side of the plane of the Earth's travel, the ecliptic, when viewed from earth.

Transfer the circle and band width by two further circles onto the face of the earth and correct for the tilt, then the Equator plus the Tropics of Cancer and Capricorn are formed. Then, as there are 12 signs of the zodiac and 12 months of the year, when a Star sign cut the Equator the dates for each action could be established and Astrology, "good luck" or similar prognostications were born.

ASTROLOGICAL LATITUDES Diagram cgPl2D03

For our purposes the Star signs are less important than the Ecliptic and Tropics. Those angular lines set at c24 degrees to the Equator, when transferred to the globe and set at 24 degrees north and south of the Equator can provide us with a totally different form of what we now know as Latitude and Longitude.

Thus from a given point on the earth's surface a graticule can be drawn based upon the Babylonian 360 degrees or 6 x 60 degrees (as Eratosthenes chose) set at c24 degrees incline to the equatorial line.

However, that is not the only possibility.

The equatorial line and the two tropics also form secondary angular alignments by utilising all three lines. That is from the Tropic of Cancer to the Equator and then from the Equator to the Tropic of Capricorn. The diagonal lines joining the pairs are secondary ecliptics and of course are parallel and at c12 degrees to the Equator.

Thus astrologers and geographers had a choice of graticule to utilize when constructing a map of the oikoumene or the world.

CLIMA OR CLIMATE Diagram cgPl2D04

CLIMA—Κλίμα

The Greek word Clima is literally a slope or inclination. Geographically it is supposed to be the slope of the Earth's surface and is used by Romans such as Vitruvius in its Latin form of "inclination" (and also declination and divergentia).

Plutarch[1] (157-86 BCE) wrote about the Cimbrii, "geographically they are situated under that part of the sky where, because of the declination of the parallels, the pole has a great elevation and appears to be not far from the zenith: and the year is divided into two equal periods, one of night and one of day."

Thus it would appear Plutarch is discussing the zenith as the vault of the heavens with the pole star there-at. With declination of parallels and a great elevation for the Pole we can assume sloping or ecliptic parallels, or else the pole has no parallel as such.

It is important that the first paragraph regarding "Clima" from W. Smith's Dictionary[2] of Greek and Roman Antiquities (1875) is quoted here;

"Clima (Κλίμα), literally a slope or inclination, was used in the mathematical geography of the Greeks with reference to the inclination of various parts of the earth's surface to the plane of the equator. Before the globular figure of the earth was known, it was supposed that there was a general slope of its surface from south to north, and this was called Κλίμα. But as the science of mathematical geography advanced, the word was applied to different belts of the earth's surface, which were determined by the different lengths of the longest day at their lines of demarcation. The division into climates was applied only to the northern hemisphere, as geographers had no practical knowledge of the earth south of the equator."

An inclination to the plane of the equator is precisely the ecliptic and its parallels found by the apparent progress of the earth across the star signs of the heavens.

Thus it is possible to opine that the original Greek Clima were derived from

Babylonian astronomy/astrology and paralleled the ecliptic or its semi-part and originally the graticules dividing the earth's surface into zones/bands were inclined to the equator.

COMMENT

In his monograph, J.J. Tierney[3] sums up the situation as follows;

"In the first place the heading of Pliny's chapter on the parallels, cap.39, section 211, refers obviously to all that follows as far as the end of Book VI, and shows that the complete passage is taken from Greek sources. His proximate source he, moreover, names in section 217, according to his usual custom, as Nigidius Figulus. Detlefsen pointed this out in 1909, and Kroll (after Honigmann) throws further light on the subject in his article on Nigidius in R.E.XVII, 200-212 (1936). Pliny's seven klimata are a piece of astrological geography and derive through Nigidius from Serapion of Antioch, who was probably a pupil of Hipparchus, or if not was a student of his work. Nigidius was a notorious student of the occult and his astrological geography was contained in a work apparently entitled "de terries". This work seems to have included his commentary on the "sphaera Graecanica" describing the Greek constellations and his "sphaera barbaric" on the non-Greek constellations. Nigidius's "barbaric sphere" was derived from the like named work of Asclepiades of Myrlea. The detailed extension of the Greek parallels into the Roman west is apparently due to Nigidius/."

But at all times the inference is Clima or Klimata set at an angle to the equator and not simply latitude as we would recognise.

CLIMATES, CLIMATA—ΚΛΙΜΑΤΑ Diagrams cgPl2D05 and cgPl2D06

When we discuss "Climates" it is a totally mathematical/geographical phenomenon. The length of the longest day at any given latitude will vary from 12 hours at the equator to 6 months at the North Pole. Normally the "Climates' are given at quarter or half hourly intervals with major sites also identified by their gnomon shadow ratio at the equinox which is the latitude by tangent ratio.

The accuracy of the measurement is of course a major factor, and to ensure a degree of accuracy perhaps the measurement was from sunrise to sunset and again to sunrise thus allowing for the subdivision of the 24 hours by ratio.

Therefore, when we read of the longest day given as 14 equinoctial hours and a half hour and one thirtieth of an hour we are in fact reading that the accuracy is 2 minutes. If in fact it is correct then it is a phenomenal accuracy for the age, and required a rather large gnomon to produce such fine detail.

THE MAP OF AGRIPPA AND ITS ANTECEDANTS
Diagrams cgPl2D07, cgPl2D08, cgPl2D09, cgPl2D10 and cgPl2D11

We do not have any original maps, least of all the map by Agrippa which existed in the first century of our era. We know of maps drawn by ancient geographers from the 6th C BCE, and have reconstructions of many.

Illustrated are reconstructions of, Hecataeus 6th BCE; Herodotus 450BCE; Dicaearchus 300BCE; Eratosthenes 194BCE; Posidonius 140BCE; Agrippa 5BCE; Strabo

15CE; Pomponius Mela 40CE, and we should not forget the Roman Fresco of c50CE which indicates a globe world with latitudinal and longitudinal lines.

What many of these reconstructions have in common is that the North African Littoral is drawn as a basic east/west alignment. This is of course markedly different from its geographical form.

However, as Strabo basically used the work of Eratosthenes and Pomponius Mela was a contemporary of Pliny they were not at the forefront of the seed change in cartographical design which saw, with the work of Marinus the Tyrian and Claudius Ptolemy, a geographical map with the oikoumene in a very recognisable and naturalistic form.

This seed change had but one motivator, the Roman Empire and the instruction by Julius Caesar to survey the world.

In 54BCE, Julius Caesar instructed that a world map be prepared and surveyors were sent out in the primary directions to gather the required geographical data (this is detailed in my text **StM1**). Those surveyors reported back, the latest in 18 BCE, obviously well after the assassination of Julius Caesar in 44BCE. However, his adopted son Augustus was then emperor and Agrippa was charged with completing the task. Unfortunately Agrippa died in 12BCE leaving the completion of the map to his sister Vipsania Polla, and finally it appears Augustus himself took charge. Whether it was completed in 7BCE is uncertain; Dio Cassius says not but Strabo at the same time talks of "the chorographic map".

J J Tierney states*; "The consensus of the views of modern scholars on Agrippa's map is that it represents a conscientious attempt to give a credible version of the geography of the known world. It relies on the general scheme of the Greek maps which had been current since the time of Eratosthenes and Hipparchus, and attempts to rectify them, particularly in Western Europe, with recent information derived from the Roman itineraries and route-books."*

He then continues, *"But this consensus is not quite complete and therefore I now turn to consider the view of Agrippa's map put forward by Professor Paul Schnabel in his article in "Philologus" of 1935 (XC. P 405ff.). Schnabel, while expressing appreciation of the earlier work of Alfred Klotz, yet criticizes Klotz severely on two grounds. Firstly, Klotz has not discussed the possible use of Agrippa in Ptolemy's "Geography", and secondly, and much more fundamentally, he has not recognized the scientific importance of the world map of Agrippa as a link between Eratosthenes and Hipparchus on the one hand and Marinus and Ptolemy on the other, but has merely repeated traditional views dating from the end of the last century. These views stated that Agrippa's work was constructed on the basis of Roman itinerary measurements and took no note of scientific results of the astronomical geography of the Greeks."*

The major point to recognize within the foregoing is the link from the slightly stylistic Greek maps to natural maps or geographical maps based upon solid scientific facts deduced from accurate readings. Between the map of Agrippa and that of Marinus, although we know both Strabo and Pomponius Mela were writing their geographical treatises, it appears that only Pliny was privy to the written commentaries of Agrippa.

Then, it would appear that after the death of Pliny in 79CE, Agrippa's work was

disseminated and the natural or geographical world as depicted by Marinus/Ptolemy was possible.

PLINY, NATURAL HISTORY Diagram cgPl2D12

The primary source for our understanding of the map commentaries by Agrippa is the text by Pliny the Elder, "Natural History". The geographical texts which contain the data are contained in Books III to VI, and our particular studies are focused upon Book VI, chapters 38 and 39.

In 6/38 we read of various geographers estimates of the length of the Mediterranean Sea, as follows;

"Having now fully described the earth both without as well as within, it seems only proper that we should succinctly state the length and breadth of its various seas. Polybius has stated, that in a straight line from the straits of Gades to the mouth of the Maeotis, it is a distance of 3437.5 mpm, and that , starting from the same point, the distance in a straight line to Sicily is 1250mpm, from thence to Crete 375mpm, to Rhodes 187.5mpm, to the Chelidonian Islands the same distance, to Cyprus 225mpm, and from thence to Seleucia Pieria, in Syria, 115mpm: the sum of all which distances amounts to 2340mpm. Agrippa estimates this same distance, in a straight line from the Straits of Gades to the Gulf of Issus, at 3340mpm; in which computation, however I am not certain that there is not some error in the figures, seeing that the same author has stated that the distance from the Straits of Sicily to Alexandria is 1350mpm."

Diagram cgPl2D12 illustrates the correct route mileage from the Straits of Gades to the Gulf of Issus and includes the superimposed Polybius/Artemidorus distances. The distance measures of Agrippa can be explained as follows;
Geographically; Gades, 6^0 20' W to Issus, 36^0 10' E = 42^0 30' x 488.14 = 20767 stadia
Agrippa; 3340mpm = 26720 stadia, or 3340 x 1.4791 = 4940Km.
But, 42^0 30' x 89.911Km = 3821.21Km or 2583.47mpm and thus it would appear that Agrippa's measurement is some 1100Km over-length and is quite frankly a gross error in translation as most of the inter-distances given are correct.

Thus it is quite obvious that both Polybius and Agrippa are quoting measurements that must originate from another source, one using a different measure. That measure is in all probability the Stadion of Eratosthenes, the only geographer to fully dimension the oikoumene and the Mediterranean Sea. As indicated in the first text **cgPl1,** we may assume that Pliny has once again translated the original Stadia measures into mpm without realising the fact that the base unit is not $1/8^{th}$ mpm but 0.1575Km or slightly more than 9 stadia per mpm.
Thus 26720 stadia of 0.1575Km = 4208.4Km or 2845.24mpm, which is only a c10% expansion of the geographical distance and would thus accord with the sailing route as indicated on the diagram. This minor expansion can thus be ignored in our investigation into the map of Agrippa and the data can thus be tested against a geographical map of the Mediterranean Sea of compatible projection; i.e. Mercator or meridional parts.

PLINY BOOK VI CHAPTER 39 Diagram cgPl2D13

In text **cgPl1,** following the discussion concerning other researchers attempts to reconstruct the map of Agrippa, I stated that, "*the parallels as described by Pliny and plotted upon a geographical map are rather entwined as opposed to the textual inference of horizontal bands across the Earth's surface. The most obvious reason for the curvilinear shapes is that the map projection is wrong."*

How else could the whole of the North African littoral fall under one Climata, even a slightly extended Climata, when Alexandria is 31^0N and the Pillars of Hercules are 36^0N?

Thus the distorted maps of previous researchers were drawn trying to contort that littoral into compliance with the text description.

But, the second circle or parallel covers the landscape from Persepolis at 29^0 55'N, to the southern parts of Cyprus and maritime parts of Cilicia, the latitude of the whole Mediterranean Sea at $36/37^0$N.

In the previous text I adhered to my primary statement that I was merely illustrating the geographical data that Pliny had included in his text, and based upon a geographical map endeavoured to illustrate the complexity of the parallels described in Book VI chapter 39.

The complete text of that book chapter is now repeated so that the actual reasoning behind the text can be illustrated and thus the maps format exposed.

BOOK 6, CHAPTER 39;"DIVISIONS OF THE EARTH INTO PARALLELS AND SHADOWS OF EQUAL LENGTH"

"To the above we shall add even another instance of ingenious discovery by the Greeks, and indeed of the most minute skilfulness; that so nothing may be wanting to our investigation of the geographical divisions of the earth, and the various countries thereof which have been pointed out; that it may be better understood, too, what affinity, or relationship as it were, exists between one region and another, in respect to the length of their days and nights, and in which of them the shadows are of equal length, and the distance from the pole is the same. I shall therefore give these particulars as well, and shall state the divisions of the whole earth in accordance with the various sections of the heavens. The lines or segments which divide the world are many in number; by our people they are known as "circuli" or circles, by the Greeks they are called "paralleli" or parallels."

"The first begins at that part of India which looks towards the south, and extends to Arabia and those who dwell upon the borders of the Red Sea. It embraces Gedrosi, the Carmanii, the Perse, the Elymaei, Parthyene, Aria, Susiane, Mesopotamia, Seleucia surnamed Babylonia, Arabia as far as Petra, Coele Syria, Pelusium, the lower parts of Egypt called Chora of Alexandria, the maritime parts of Africa, all the cities of Cyrenaica, Thapsus, Adrumentum, Clupea, Carthage, Utica, the two Hippo's, Numidia, the two Mauritanias, the Atlantic Sea, the Pillars of Hercules. Within the meridians this parallel, on the middle day of the equinox, the pin of the dial , usually called the gnomon , if 7 feet in length, throws a shadow at mid-day no more than 4 feet long, the longest day and night are 14 equinoctial hours respectively, the shortest being only 10".

"The next circle or parallel begins with the western parts of India, and runs through the middle of Parthia, through Persepolis, the nearer parts of Persis, the nearer Arabia,Judea, and the people who live near Mount Libanus, and it embraces Babylon, Idumaea, Samaris, Hierosolyma, Ascalon, Joppa, Caesarea in Phoenicia, Ptolemais, Sidon Tyre, Berytus, Botrys, Tripolis, Byblus, Antiochia, Laodicea, Seleucia, the maritime parts of Cilicia, the southern parts of Cyprus, Crete, Lilybaeum in Sicily, and the northern parts of Africa and Numidia. In these regions, at the time of the equinox, a gnomon of 35 feet in length gives only a shadow 24 feet long; and the longest day and night are respectively 14 equinoctial hours, and one fifth of an hour in length."

"The third circle or parallel begins at the part of India which lies in the vicinity of Mount Imaiis, and runs through the Caspian Gates and the nearer parts of Media, Cataonia, Cappadocia, Taurus, Amanus, Issus, the passes of Cilicia, Soli, Tarsus, Cyprus, Pisidia, Side in Pamphylia, Lycaonia, Patara in Lycia, Xanthus, Caunus, Rhodes, Cos, Halicarnassus, Cnidus, Doris, Chios, Delos, the middle of the Cyclades, Gythium, Malea, Argos, Laconia, Elis, Olympia, Messenia in the Peloponnesus, Syracuse, Catina, the middle of Sicily, the southern parts of Sardinia, Carteia and Gades. A gnomon 100 inches in length throws a shadow 77 inches long, the length of the longest day is 14 equinoctial hours and a half, plus one thirtieth of an hour."

"*Under the fourth circle or parallel lie those parts of India which are on the other side of the Imaiis, the southern parts of Cappadocia, Galatia, Mysia, Sardis, Smyrna, Sipylus, Mount Timolus, Lydia,Caria, Ionia, Tralles, Colophon, Ephesus, Miletus, Chios, Samos, The Icarian Sea, the northern part of the Cyclades, Athens, Megara, Corinth, Sicyon, Achaia, Patrae, the Isthmus, Epirus, the northern parts of Sicily, the eastern parts of Gallia Narbonensis, the sea-coast of Spain, from New Carthage westward. In these districts a gnomon of 21 feet throws a shadow of 16 feet in length; the longest day contains 14 equinoctial hours and 2/3 hour."*

"Under the fifth zone are included, from the entrance to the Caspian Sea, the Bactri, Iberia, Armenia, Mysia, Phrygia, the Hellespont, Troas, Tenedos, Abydos, Scepsis, Illium, Mount Ida, Cyzicus, Lampsacus, Sinope, Amisus, Heraclea in Pontus, Paphlagonia, Lemnos, Imbros, Thasos, Cassandria, Thessaly, Macedonia, Larissa, Amphipolis, Thessalonica, Pella, Edessa, Bercae, Pharsalia, Carystus, Euboea in Boaotia, Chalcis, Delphi, Acarnanis, Aetolia, Apollonia, Brundisium, Tarentum, Thurii, Locri, Rhegium, the Lucani, Neapolis, Puteoli, the Tuscan Sea, Corsica, The Balearic Islands, and the middle of Spain. A gnomon, 7 feet in length, in those countries gives a shadow of 6 feet and the length of the day is 15 equinoctial hours."

"The sixth division, in which Rome is included, embraces the Caspian nations, Caucasus, the northern parts of Armenia, Apollonia on the Rhyndacus, Nicomedia, Chalcedon, Byzantium, Lysimachia, the Chersonesus, the Gulf of Melas, Abdera, Samothracia, Maronea, Aenus, Bessica, Thracis, Maedica, Paeonia, the Illyrii, Dyrrhachium, Canusium, the extreme parts of Apulia, Campania, Etruria, Pisae, Luna, Luca, Liguria, Antipolis, Massilia, Narbo, Tarraco, the middle parts of Hispania Tarraconensis, and thence

through Lusitania. A gnomon of 9 feet here throws a shadow 8 feet long; the greatest length of the day is 15 equinoctial hours plus 1/9th part of an hour, or according to Nigidius 1/5th."

"The seventh division begins on the other side of the Caspian sea, and the line runs above Callatis, and through the Bosporus, the Borysthenes, Tomi, the back part of Thrace, the Triballi, the remainder of Illyricum, the Adriatic Sea, Aquileia, Altinum, Venetia, Vicetia, Patavium, Verona, Cremona, Ravenna, Ancona, Picenum, the Marsi, the Peligni, the Sabini, Umbria, Ariminium, Bononia, Placentia, Mediolanum, all the districts at the foot of the Apennine , and, beyond the Alps, Gallia Aquitania, Vienna, the Pyreneaen range, the Celtiberia. A gnomon 35 feet in length here throws a shadow of 36 feet, except in some parts of Venetia where the shadow just equals the length of the gnomon; the longest day is 15 3/5ths equinoctial hours."

"Thus far we have set forth the results of observations made by the ancients. The remaining part of the earth has been divided, through the careful researches of those of more recent times, by three additional parallels. The first runs from the Tanais through the Maeotis and the country of Sarmatae, as far as the Borysthenes, and so through the Daci and part of Germany, and the Gallic provinces, as far as the shores of the ocean, the longest day being 16 hours."

"The second parallel runs through the country of the Hypoborei and the Island of Britannia, the longest day being 17 hours in length.

The last of all is the Scythian parallel, which runs from the Riphaean range to Thule, in which, as we have already stated the year is divided into days and nights alternately for 6 months duration."

"The same authors have also placed before the first parallel which we have given here, two other parallels or circles; the first running through the Island of Meroe and the city of Ptolemais which was built on the Red Sea for the chase of the Elephant; where the longest day is 12 ½ hours in length; and the second passing through Syene in Egypt, in which the longest day is 13 hours. The same authors added ½ hour to each of the parallels until they came to the last."

"Thus far on the Geography of the Earth."
Thus ends the geographical text of Pliny.

Whilst analysing the above text for **cgPl1** it was very apparent that there were other possibilities to explain the parallels as described by Pliny.

Thus by using a Mercator/Meridional Parts map projection of the world from India to Iberia/North Africa and of course Britannia it was possible to trace the alignments described in the text of 6/39.

Diagrams cgPl2D14 to D18 illustrate the parallels first singularly, but using both determinants, that is shadow length and day length, to plot a pair of parallel lines across the maps surface. There is then a combined parallels map of the Mediterranean area and finally a combined parallels map from India to Europe, the full extent of the text descriptions. They

have been colour coded as the original diagram in cgPl1D16 and I have appended Pliny's text for each so that the alignments can be followed across the map.

THE FIRST PARALLEL, Diagram cgPl1D14

Gnomon, 7 feet; Shadow, 4 feet; Latitude, 29.745 degrees
Longest Day, 14 equinoctial hours; Latitude 30.8 degrees
Southernmost land area, Gedrosia/Carmania, 24^0N
Northernmost land area, Pillars of Hercules, 36^0N.

Thus we have a 12 degree latitudinal shift between the places described, but only a single degree in terms of detailed positioning.

But, if having drawn the two latitudinal lines at 29.745 and 30.8 degrees north we then draw a line from the borders of India on the ocean to the Pillars of Hercules we find that it is basically a 12 degree angular line and thus the half ecliptic angle formed by a line from either Tropic to the Equator.

There is a further coincidence with this line, it passes close to Alexandria.
Thus if we actually draw a 12 degree angle line, basically towards the Poles through Alexandria and then from where it crosses the two latitudinal lines draw the 12 degree semi-ecliptic parallels we find that they encompass completely the land areas described by Pliny in his First Parallel text. That is they encompass Gedrosia/Carmania, the littoral of Egypt and Cyrenaica, then Africa, Numidia and finally the two Mauretania's to the Pillars.

Thus we see the astrological data being entwined into the geographical data and the reason for the mention of Nigidius Figulus within Pliny's text at the 6^{th} parallel.

COMMENT
THE SACRED PROMONTORY OF IBERIA

The above investigation indicated one curious feature which must be examined; the apparent alignment of The Sacred Promontory to Alexandria via the 12 degree astrological line.

The appellation Sacred Promontory was originally a Greek naming of many such promontories, probably from their propensity for placing Temples at such points. But, the Iberian promontory only has some Neolithic Stones, sacred no doubt to those Peoples, but, for a long period this was the end of the oikoumene. Strabo and Artemidorus describe this place with its nearby Stones, but are they referring to Ponta de Sagres, which is where the Stones are and not actually Cape St Vincent which is only c5Km distant. Ponta de Sagres translates as Sacred Point, but that may be a later appellation. Although these two points are so very close together, thus for most purposes it matters not which is chosen, the curious alignment from Alexandria at c12 degrees may account for the reasoning by Marinus the Tyrian and Claudius Ptolemy to use this point as their prime measurement. Yes, this ignores the 2 ½ degrees from the Fortunate Isles, but in fact they are unimportant within their texts. The most important fact is that the Sacred Promontory is so very precisely located north of Alexandria by Marinus/Ptolemy as I illustrate in texts Cp2 and Cp4. This point is the second most prime locator for their geography after Alexandria.

THE SECOND PARALLEL Diagram cgPl2D14

Gnomon, 35 feet; shadow, 24 feet; latitude, 34.439 degrees north

Longest day, 14 Equinoc. Hours plus 1/5th hour; Latitude, 33^{0} north
Southernmost land area, Persepolis, 29^{0} 55' N
Northernmost land area, Laodicea Seleucia, 35^{0} 31' N

Thus we have a 6 degree latitudinal shift, but a spread of 33^{0} to 34.439^{0} given.

The normal latitudinal band given encompasses the central area of the eastern Mediterranean littoral and practically the same parts of Numidia and Mauretania as the 12 degree lines described within Parallel 1.

The 12 degree alignment does however cover Persepolis, practically the southern parts of Cyprus, Crete, and Lilybaeum of Sicily.

It does not include the maritime parts of Cilicia and thus it is possible to opine that this is a scribal error in copying. This should be part of the third parallel.

THE THIRD PARALLEL Diagram cgPl2D15

Gnomon, 100 inches; Shadow, 77 inches; latitude, 37.596 degrees
Longest day, 14 Equinoc. Hours plus ½, plus 1/30th hour; Latitude, 36.8 degrees
Southernmost land area, Carteia/Gades, c36^{0}N
Northernmost land area, Catania Sicily, c38^{0}N

Thus we have a 2 degree latitudinal spread and a 0.8 degree given span.

This 3rd parallel is mainly described by the 0.8 degree span given by Pliny from the Caspian Gates to Gades along the 36th and 37th parallels. The inclusion of Cappadocia could be seen as a scribal copyist error as the 4th parallel section includes the "southern parts of Cappadocia".

However, the 12 degree band alignment does indicate another anomaly, that of Northern Sardinia being encompassed and not Southern Sardinia as Pliny's text states. It is hard to explain this as other than another error, as shifting Sardinia northwards would create a rather large expansion of the Mediterranean Sea latitudinally, given its geographical position.

THE FOURTH PARALLEL Diagram cgPl2D15

Gnomon, 21 feet; Shadow (16) 17 feet; Latitude, 38.99 degrees
Longest day, 14 + 2/3rds Equinoct. Hours; Latitude, 38.167 degrees
Southernmost land area; New Carthage,c38 degrees north
Northernmost land area; Gallia Narbonensis, c42 degrees north

The fourth parallel with its adjusted ratio fairly represents the geographical facts as the diagram illustrates. But, "the eastern Parts of Gallia Narbonensis" are only correct on the 12 degree plot.

There is however an alternative view.

ADDENDUM; THE THIRD AND FOURTH PARALLELS CORRECTED
Diagram cgPl2D16

The text of Pliny 6/39 locates the 3rd parallel at 37^{0} 36'N and the 4th parallel at 37^{0} 18'N. I opined in text **cgPl1** that this was probably a scribal error as the latitudes were reversed, and this could be due to a mis-reading of 17, that is xvii written as xvi. A simple error which if corrected placed the 4th parallel at 38^{0} 59'N, i.e. above the third parallel and approximately midway between the 3rd and 5th parallels.

However if the latitude of the 3rd parallel was mis-copied and should have been the 21/16 ratio or 37^0 18' (not 37^0 36') there would be greater correspondence to the geographical facts and the place-names given by Pliny. If the 4th parallel was then to be given the 37^0 36' latitude, there would be even greater correspondence and the zones would be expressed as follows;

3rd Parallel; 37^0 18' Gnomon and 36^0 48' longest day

4th Parallel; 37^0 36' Gnomon and 38^0 10' longest day.

The longest day hours are maintained as written because they form a natural progression.

A separate diagram for the reversed 3rd and 4th parallels has been included to indicate not only the probable correctness of the assumption by the numerous correspondences of Poleis, but also to indicate that the 12 degree alignment is also maintained commensurate with the latitude.

The revised 4th parallel now at 37^0 36' provides for a correspondence with most Poleis situate c38N, but surprisingly Ephesus is situate at 37^0 36'N as well as Carthago Nova, and these are no doubt the positions where gnomon readings would have occurred.

It is obvious from the text that there is substantive scribal error within all of the parallels, but particularly the 3rd and 4th, with Chios in both and the Southern parts of Cappadocia (4th) following Cappadocia (3rd). However, this is probably as close as we can get to the original text.

THE FIFTH PARALLEL Diagram cgPl2D17

Gnomon, 7 feet; Shadow, 6 feet; Latitude 40.601 degrees north

Longest day, 15 hours; Latitude, 41.283 degrees north

Southernmost land area, The Balearic Isles, 39^0N

Northernmost land area, Caspian Sea and Iberia/Bactria, 45^0N

Thus we have a geographical spread of 6 degrees and a given spread of 0.6 degree.

But this fifth parallel indicates that there is a copyist error with the addition of Euboea in Boeotia and Delphi, which should be under the 4th parallel along with the Balearic Islands.

THE SIXTH PARALLEL Diagram cgPl2D17

Gnomon, 9 feet; Shadow, 8 feet; Latitude 41.663 degrees

Longest day, 15 1/9th (15 1/5th) hours; Latitude, 42.283 degrees

Southernmost place; Lusitania (37 to 43 degrees north)

Northernmost place; Caspian nations, (37 to 47 degrees north)

This sixth parallel appears to be an amalgam of both the latitudinal lines and the 12 degree alignment to incorporate all that is contained between them. Pliny knows that from Rome to Pisa is a long journey north but in describing them as belonging to a single parallel he must be merely reading from a map with a band width which we are not privy to, other than angular lines.

THE SEVENTH PARALLEL Diagram cgPl2D18

Gnomon, 35 feet; Shadow, 36 feet; Latitude, 45.807 degrees

Longest day, 15 3/5ths hours; Latitude, 46.117 degrees

Southernmost place; The Pyrenean range, 43 degrees north

Northernmost place; The Borysthenes River, 47 degrees north

This seventh parallel reverts to a normal picture having places within the latitudinal alignments. The 12 degree angular alignment appears to play no part in the text, which is probably because it projects into lands above the River Danube, an area unexplored by Ancient Greeks.

On this diagram I have included two further parallels (of 3), the first of which Pliny indicates as having 16 hours day length or at 48.867 degrees north passing through Dacia, Germany and the Gallic Provinces. However it is worth noting it is far to northerly for the Maeotis which should be named in the actual 7th parallel.

The second additional line or parallel Pliny clearly states is running through the country of the Hyperborei and the Island of Britannia, the longest day being 17 hours or 54.383 degrees north.

Pliny continues his text with*;*

"The last of all is the Scythian parallel, which runs from the Riphaean range to Thule, in which , as we have already stated the year is divided into days and nights alternately for 6 months duration."

This of course only occurs at the North Pole, 90 degrees Latitude (or there-about), and we naturally assume that this Scythian parallel actually extends from the Arctic Circle, day length c24 hours, through the various stages of month long days to the 6 months day length at the North Pole. This conflation of c24 degrees for the northern areas is perhaps a guide to the foregoing text in that it is a generalisation of places around the various parallels and not an exact reading of geographical locations.

Pliny then describes another two parallels placed before the first, through Meroe and Syene.

Here there is clearly a conflict of data as the day length given as 12 ½ and 13 hours for Meroe and Syene, are in fact for the Torrid Zone and Meroe. We should be reading 13 and 13 ½ hours for Meroe and Syene, thus his final comment that; *"The same authors added ½ hour to each of the parallels until they came to the last*" is pertinent.

We may therefore assume there were parallels south of Alexandria, not counting the Equator at 12 hours, those of 12 ½, 13, 13 ½ and thus Alexandria being on the 14 hour climate.

COMBINED PARALLELS Diagrams cgPl2D19 and cgPl2D20

The complexities of Pliny's examples in 6:39 are well illustrated when the parallels are drawn upon a single map. It would be nigh impossible to read from just one map incorporating both the standard latitudinal bands and the astrological 12 degree inclined bands. Therefore we may assume Pliny is discussing two near geographical maps with these alignments indicated.

THE GNOMON LOCATIONS

There appears to be no raison d'être to the gnomon ratios and/or the longest days chosen. They do not quite match the Hours, in some instances being wildly different.

It does not matter that the zones are not contiguous, that is not a prerequisite for

determining the parallels, but, obviously the "Climates" are naturally contiguous given their basis in fact.

Thus we must establish the basic location for each gnomon ratio.

First Parallel; gnomon, 7 feet, shadow, 4 feet, latitude 29^0 45'N. The most likely location for this 7:4 ratio within the text is south of Alexandria (31N) at the Pyramids of Giza, which are situated at 29^0 59'N. The ancient Egyptians were very adept at locating places by their ratio and over millennia built a large body of knowledge on the subject. The Roman Empire was quite limited in this region being merely a coastal strip, the Mediterranean littoral, and this latitude passes through Egypt, Cyrenaica and parts of Africa Proconsularis, but is surprisingly close to the latitude of Persepolis in the 2nd parallel.

It is possible the reading was taken at Arsinoe, the head of the Red Sea or Gulf of Suez, which was important in Roman times.

Second Parallel; gnomon 35 feet, shadow 24 feet, latitude 34^0 26'N. Before even considering where the place for this reading was situated, we must look at the extraordinary height of the gnomon. In Egyptian, Greek and Roman Poleis columns were erected for various purposes including timekeeping. Did each and every Polis have such a column, or was it a feature of major Poleis only?

The latitude c34 ½ degrees N provides for research in, Mesopotamia, Syria, Cyprus, Africa, Numidia and the two Mauretania's.

The text indicates it could well be Seleucia/Laodociea (Homs in Syria, 34^0 40'N) or one of the great cities of the eastern Mediterranean Sea area or even the Euphrates region. On the Mediterranean Littoral is Tripolis, 34^0 31' N and towards the east, Palmyra, 34^0 36' N. The ancient route is Tripolis to Palmyra to Dura Europus on the Euphrates.

Third Parallel; gnomon 100 inches, shadow 77 inches, latitude 37^0 36' N. Listed by Pliny is Catania, Sicily, geographically 37^0 31' N and Olympia in the Peloponnesus, 37^0 38' N.

Fourth Parallel; gnomon 21 feet, shadow 16 feet (17 feet), latitude 37^0 18' N (38^0 59'). The addendum text requires to be considered, but, as shown, the many Poleis named are quite possibly the source of the reading.

Fifth parallel; gnomon 7 feet, shadow 6 feet; latitude $40^0$36'N. The parallel is again quite accurate and many of the poleis listed could be considered the originator of the latitudinal reading.

Sixth parallel; gnomon 9 feet, shadow 8 feet; latitude $41^0$40'N.

Rome is $41^0$53.5' N, and contained many "Obelisks", including the "Obelisk of Montecitorio", some 71 feet high.

Pliny in 36/14, entitled "Obelisks", commences thus;

"Monarchs, too, have entered into a sort of rivalry with one another in forming elongated blocks of stone, known as "Obelisks", and consecrated to the divinity of the Sun. The blocks had this form given to them in resemblance to the rays of that luminary, which are so called in the Egyptian language"

The last sentence of 36/14 is in fact quite telling in its content;

"The obelisk that was erected by the late Emperor Augustus in the Great Circus (Maximus) was originally quarried by order of King Semenpserteus, in whose reign it was that Pythagoras visited Egypt. It is eighty-five feet (or 82) and three-quarters in height, exclusive of the base, which is part of the same stone. The one that he erected in the Campus Martius, is nine feet less in height, and was originally made by order of Sesothis. They are both of them covered with inscriptions, which interpret the operations of nature according to the philosophy of the Egyptians".

Then in 36/15, entitled, "The Obelisk which serves as a Dial in the Campus Martius", we read, *"The one that has been erected in the Campus Martius has been applied to a singular purpose by the late Emperor Augustus; that of marking the shadows projected by the sun, and so measuring the length of the days and nights. With this object, a stone pavement was laid, the extreme length of which corresponded exactly with the length of the shadow thrown by the obelisk at the sixth hour (mid-day) on the day of the winter solstice. After this period, the shadow would go on, day by day, gradually decreasing, and then again would as gradually increase, correspondingly with certain line of brass that were inserted in the stone; a device well deserving to be known, due to the ingenuity of Facundus Novus, the mathematician. Upon the apex of the obelisk he placed a gilded ball in order that the shadow of the summit might be condensed and agglomerated, and so prevent the shadow of the apex itself from running to a fine point of enormous extent; the [plan being first suggested to him, it is said, by the shadow that is projected by the human head. For nearly the last 30 years, however, the observations derived from this dial have been found not to agree; whether it is that the sun itself has changed its course in consequence of some derangement of the heavenly system; or whether that the whole earth has been in some degree dis-placed from its centre, a thing that, I have heard say, has been remarked in other places as well; or whether that some earthquake, confined to this city only, has wrenched the dial from its original position; or whether it is that in consequence of the inundations of the Tiber, the foundations of the mass have subsided, in spite of the general assertion that they are sunk as deep into the earth as the obelisk erected upon them is high.*

The third obelisk at Rome is in the Vaticanian Circus, which was constructed by the Emperors Caius and Nero; this being the only one of them all that has been broken in the carriage. Nuncoreus, the son of Sesoses, made it; there remains another by him, one hundred cubits in height, which, by order of an oracle, he consecrated to the Sun, after having lost his sight and recovered it."

Thus we can see that the Gnomon varied considerably in height but was most affected by its verticality, which will alter the shadows path considerably with just a small deviation in that verticality.

Seventh Parallel, gnomon 35 feet, shadow 36 feet; latitude 45^0 48'N
Certainly the Bosporus, Venice etc, Milam, Vienne and Aquitania are all very close to this latitude. Where the reading was taken therefore is probably indeterminate.

Thus it would appear Pliny is generalising and perhaps choosing ratios at random rather than itemize each with a corresponding Equinoctial Hours reading.

But there is one last investigation required that of the display of the map itself in the Porticus Vipsania.

ALTERNATIVE IDEAS Diagrams cgPl2D21 and cgPl2D22

"La Carte d'Agrippa: Nouvelle proposition de lecture" by Pol Trousset.
In 1993 the above paper was published in,
"Dialogues d'histoire ancienne", Vol 19, No2 1993, pp137-157.
The abstract is as follows;
"When we try to depict what sort of a world "map", conceived by Agrippa, was to be seen in the Porticus Vipsania, several models have been proposed by scholars, according to different types of "Orbes terranum" laid out by ancient cartography; either a sort of road system, of which the Peutinger table was a good example, or an oblong map as the model was given in the Age of Augustus by Greek scientific cartography, or a circular scheme of oikoumene, known as T-O and very common in the late Roman period. Another way for this reconstruction could be supported on Pliny's annotations about Agrippa; the "map' would be a sort of triptyque, with the three parts of the world, painted or carved on each wall of the portico and oriented respectively towards the North, the South and the east. Such a representation would conform to the Roman vision of the oikoumene and be useful as a tool for the Augustean imperial propaganda."
The text contains three figures which I have reproduced and invite interested parties to download the text (its French) from;
http://www.persee.fr/web/revues/home/prescript/article/dha_0755_7256_1993

CONCLUSION Diagram cgPl2D23 and cgPl2D24

In her text, "Pliny's Catalogue of Culture; Art and Empire in the Natural History", published by O.U.P., on page 64, Sorcha Carey makes the following point;
"In an effort to picture Agrippa's map against the background of surviving evidence of earlier Roman maps, scholars have pored over the minutiae of Pliny's references in order to recover essential clues to the maps appearance. Pliny's mention of a relatively small Parthian town represented on the map (Charax), for example has plausibly been seen to indicate that the map showed not just the Roman Empire, but the whole oikoumene (Pliny specifically uses the phrase 'Orbis Terrarum') and that the map must have been relatively detailed. Most scholars accept that, given the recurrent detailing of distance in Pliny's references to Agrippa, the map would have included some system of measurement. But whether the measurements would have been written on the map itself or indicated either by the proportions of the representation, or in an inscription set beneath or beside the map, remains a matter of debate."

Sorcha Carey then states (P65), *"In Pliny's geography, the provision of exact measurement implies that the Romans have completely explored a county's length and breadth. And,*

fittingly, as Pliny reaches the end of his account of his world, the measurements begin to run out."

Thus all of my research and study of the texts by those multitude of researchers leads inexorably to the conclusion that the Map of Agrippa was in fact a very good geographical representation of the known world, and that this map was in all probability the fore-runner of the Map/Text produced by Marinus the Tyrian (see text **Mt1** and **Mt2**) which led to the work of Claudius Ptolemy.
Therefore from a world survey c54-26BCE, carried out by Greek Surveyors under the direct instructions of Julius Caesar, to its update and finalisation between 18-12BCE by Agrippa, and finally to its display c7BCE in the Porticus Vipsania, we can see a determined effort by the Romans to produce a document which, as has been stated regarding the map of Sardinia by Tiberius Sempronium Gracchus,
'demonstrated the complete conquest by demonstrating complete knowledge of the world it now ruled.'
Thus it is fitting to end this text with a near geographical map of Europe, Asia and Africa, which is a tribute to the c50 year's work before our common era by many surveyors and ordinary persons who recorded distance measures and geographical features for posterity.

Michael J Ferrar 2011

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2) Smith William, 1875, "A Dictionary of Greek and Roman Antiquities", John Murray, London, Article by Philip Smith BA, pages 296-297

3) Tierney J J, 1962, "The Map of Agrippa", Proc Royal Irish Academy.

All other references will be found appended to the text reference **cgPl1.**