# The Obelisk Of Augustus – Part II

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*[Ed. Note: This article is a continuation of the article begun in the prior issue of The Compendium.]*

*...dierumque ac noctium ita magnitudines...*(*Pliny* the Elder, 70 AD, XXXVI, 71-73)

"*...dierumque ac noctium ita magnitudines...", Pliny* said that while explaining the qualities of Augustus' Obelisk. The translation: "To the Obelisk of the Mars field the divine Augustus attributed the wonderful function of indicating the shadows projected by the Sun and so determining the length of the days and of the nights".

In 1531 a scholar, *Ziegler*, thought that it could be possible to read the "*magnitudines*" on the Meridian Line itself, as equipped by engraved roman numerals on the horizontal marble, near the corresponding seasonal sign; see Fig. 5.

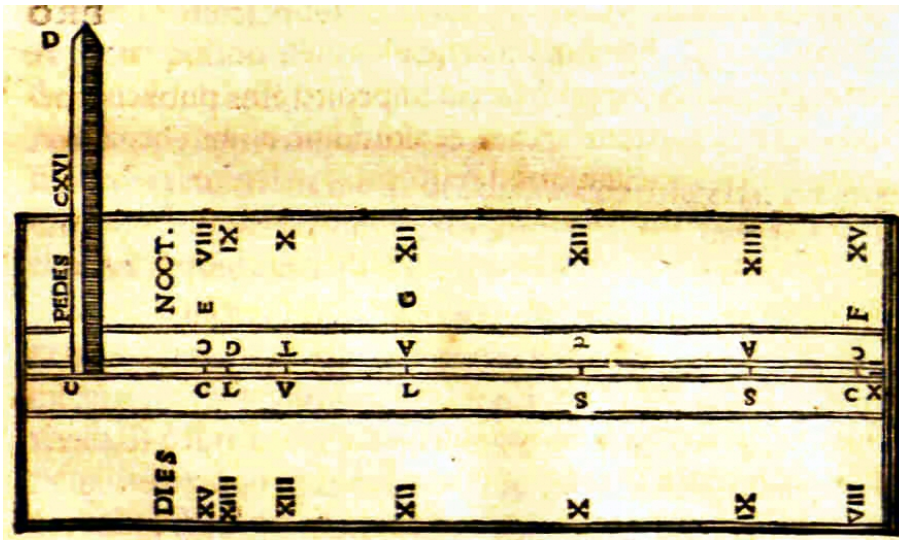


Fig. 5– The drawing of *Jacob Ziegler* (1531)

Such a hypothesis has to be rejected as no numerals have been found engraved on the marble of Professor Buchner's archaeological remains.[1]

*James Stuart*, the well-known pre-modern British gnomonist who so accurately (1754) drew the 8 sundials of *Andronicus*' Tower of the Winds in Athens, was also influenced by *Ziegler*'s drawing.

Other modern scholars, taking for granted that the dial was a huge *Horologium* for the hours of the whole day, have imagined that the lengths of days and nights could be read on a so-called "triangle of day-light". But what is this "triangle"? It is a gnomonic figure made of a particular *italic* hour- line, and a symmetric *babylonic*, which represents the instants, during the year, when the time left until sunset equals half the duration of the illuminated day at winter solstice.[2] But such a particular gnomonic figure will be a valuable gnomonic instrument *only if the sundial has been calculated for astronomical hours*. See Fig. 6.

[1] If we attentively observe the excavated portion of the Meridian Line we can immediately notice that no numeral indicating the length of days and nights appears to be engraved on the central fascia; the external fascias of the *Buchner* remains have not been completely unveiled except for the sufficiently discovered free surface at the eastern side where the sign changes from Leo to Virgo. In this portion of the Meridian Line there is no trace of the number "13" in Greek characters, the duration of the day appropriate for the season, nor the number "11" for the night.

[2] In a common modern sundial with astronomical hours the user has to proceed as follows: first he has to evaluate by means of the "triangle", on the line of equinoxes, the time elapsed from midday, say *e.g.* approximately 1.6 hours at the latitude of 42° and ecliptic 24°. See Fig. 5**.** The difference from 6.00, 4.4 will be half of the illuminated day at the winter-solstice. You have to repeat said evaluation for the actual day, *e.g.* Taurus / Virgo: this value of approximately 2.25 hours will be added to 4.4 obtaining 6.65. Then 6.65 hours will be half of the illuminated day at Taurus / Virgo at latitude 42°.

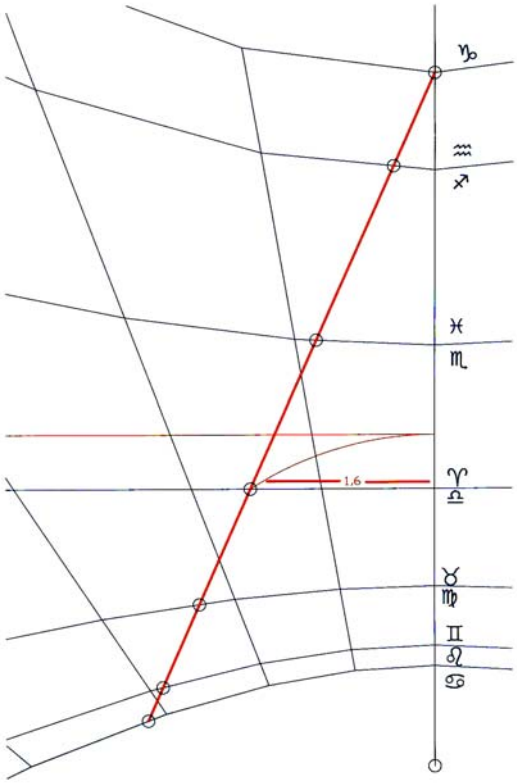


Fig. 6 – The drawing of a sundial with astronomical hours equipped with half the "triangle" of the daylight.

A Menologium was an engraved marble cube positioned in a public area, for a didactic purpose. There you could read the positions of the Sun on the Zodiac, some *parapegmatic* phrases but most of all the length, in Roman numerals, of the days and of the nights as variable in the seasons, like the "*magnitudines*" cited by *Pliny*: they were indicated in Roman numerals and therefore they were understandable by the general public.

Two *Menologiums* from ancient times have been found (one is now lost) – both in Rome in the area of the Mars field. No other *Menologiums* have been found anywhere.

If the dial has been calculated for the antique (temporal) hours, such a "triangle" is nonsense. I demonstrated it in Appendix 5 [ALBERI AUBER 2011-2012] and furthermore to the colleagues of *Seminario Gnomonico Italiano* 2012 at Chatillon (AO- Italy) [ALBERI AUBER Chatillon 2012].

In ancient times the sundials with astronomical hours were completely 100% absent, and speaking of a "triangle" on the *Horologium* of *Augustus* would be far from the truth: a "triangle" has sense only on a sundial with astronomical hours, which did not exist in antiquity, and furthermore no archaeological trace has ever been found of a *Horologium*.

Hence the reading of *Pliny's* "*magnitudines*" had necessarily to be read outside of the surface of the Meridian Line. Such a possibility would be offered to the public by a "*Menologium*". See Fig. 7.


Fig. 7 – The *Menologium* Rusticum Colotianum (Giardino Colocci, near the Mars Field)

For historical reasons probably no one of the cited findings can be recognized as a *Menologium* in connection with *Augustus*' Meridian Line.

Nevertheless a similar *Menologium* could have been positioned on the Meridian Line, near the "Cancer" sign and maybe another one near the "Capricorn".

I have to admit that we have no acknowledgement, either from archaeological literature or from epigraphy, of such a hypothesis, but I am not able to imagine other plausible hypotheses which could agree with the *Pliny* sentence.

*The profile of the Obelisk*

The monumental work of a known pre-modern scholar-priest *Angelo Bandini* (1726-1803) constitutes a priceless source of data for the study of the whole of *Augustus*' gnomonics. F. *Bandini* refers to the *James Stuart* measurements and those of the arch. *De Marchis*, who was entrusted by Pope *Benedetto XIV*, with excavating the fragments of the Obelisk crumbled to the soil after an earthquake of the 9th century.

A bronze sphere has been found in Rome, maybe the "*aurata pila*" named by *Pliny*, and preserved in the Musei Capitolini; its diameter has been measured. All the scholars agree that the sphere could in fact belong to the Obelisk. As near the winter-solstice the shadow of the sphere could be extremely small and rather evanescent, as mentioned in the 1st part of this article, we should maintain some doubts on the matter.

Now: from the Prof. *Buchner* drawings, we are exactly informed that 27 zodiacal grades cover a very well- known distance; therefore I made an exact calculation[3] of the corresponding supposed height of the center of the sphere. At this point since some heights of the components of the obelisk are known, you can try to recalculate all the levels of the Obelisk. This is not trivial.

Since the slopes of the little pyramid (*piramidetta*) on the top of the Obelisk are substantially less inclined in comparison to the rays of the Sun at the Summer-Solstice, it happens that the sphere should have been positioned much higher than the spike of the top of the "*piramidetta*". If you do not have the astuteness to arrange a long vertical bar to sustain the sphere sufficiently high, you will hardly distinguish the shadow of the sphere from the shadow of the Obelisk near the solstice. This bar should not be too long, also for aesthetic reasons.

You have to imagine, as Buchner also did, the existence of 4 spacing out bronze feet between the obelisk, the proper tapered piece of the Obelisk with the "*piramidetta*", and the marble rectangular base. Some Egyptian obelisks in antiquity, a minority of them, had such bronze feet.

Someone in the 15th century witnessed "*seven steps around*" the Obelisk; hence the hypothesis of imagining that the Meridian Line had been placed not at the bottom level of the three quadrangular basement-plinths but at a different level (ignoring the expensive and problematic bronze feet) seems to be acceptable.

In Fig. 8 we have redrawn the profile of the Obelisk with the bronze-feet as presumed by *Buchner*. In Fig. 9 the Obelisk and the Meridian Line as seen from above assuming that no bronze feet have been used in order to obtain the calculated gnomonic height.

The profile of my reconstruction seems to be rather different from the Obelisk of Piazza di Montecitorio, Rome. In fact in the photo of Fig. 3 (Part 1) only:

1 - the tapered shaped piece of marble, the one with the "*piramidetta*" at the top end, the real obelisk,

[3] The calculation gives a "gnomonic" height of 3034 cm starting from the plane of the Meridian Line to the center of the projecting sphere. This value is quite different from the 100 roman feet (2960 cm) as supposed by some scholars (including *Buchner*). We cannot exclude that the projected value of the original gnomonic plan was really 100 roman feet: the reason of this difference (2.5 %) could be found in a possible error on reading the values obtained from Analemma (see Appendix 1 in [ALBERI AUBER 2011-2012] of a 1 foot-gnomon drawing on a bronze "tympanum". In fact these values, calculated from an Analemma equipped with a 1 foot gnomon, had to be simply multiplied by the designer one hundred times. The error could have consisted in reading these engravings on the "tympanum" which result from the calculation (Analemmata, Ptolemy).

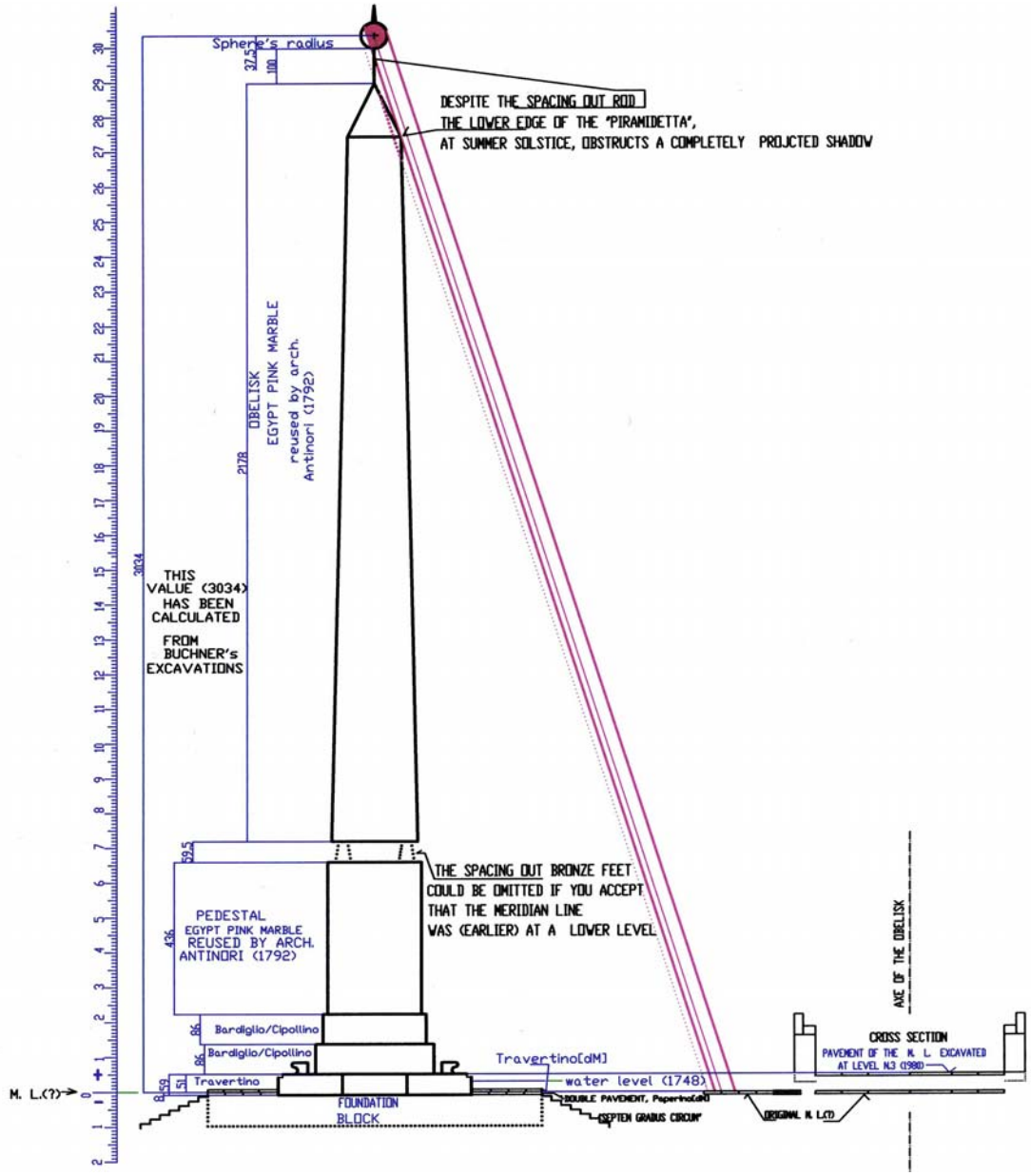


Fig. 8– The profile of the Obelisk, assuming that the Meridian Line was at the bottom level of the three quadrangular marble plinths which support the basement of pink marble of Egypt, decorated with the *Augustus* inscriptions.

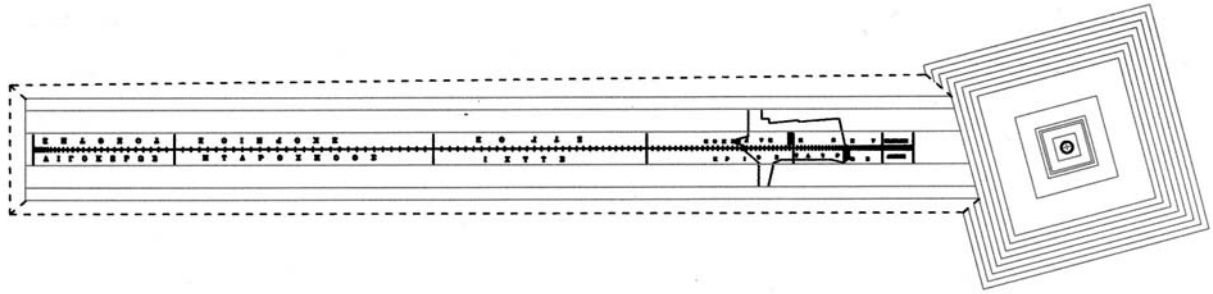

Fig. 9 – Obelisk and Meridian Line as seen from above, assuming no bronze feet were used, and the spacing out rod should be only 85.5cm instead of 100cm.

2- the quadrangular big basement of "pink marble of Egypt" under it

have to be recognized as original pieces of *Augustus'* Obelisk. The pre-modern bronze Helipsoid, the so-called *Antinori*'s Helipsoid[4] 1792 and the three plinths of white marble, excavated at that time in the region of Latium, nearby Rome, do not belong to the original Obelisk.

*Was the Meridian Line a "Parapegma"?*

First of all, we have to explain what a "*Parapegma*" really was. "*Parapegma*" (plural: *parapegmata*) refers to a poem with astronomical-meteorological-calendrical contents. There have been found very simple and short *parapegmata* engraved on marble. The poet *Geminus* (1st Cent. BCE) has reported at least 4 very long *parapegmata* whose authors were *Callippus*, *Eudoxus*, *Democritus* and *Euctemon*.

In the *Geminus parapegmata* every astronomical- calendrical- meteorological event is strictly connected to a well-specified zodiacal degree. Thanks to this text I theoretically drew a completion of the fragment of the Meridian Line unveiled by prof. *Buchner* while adding the *parapegmatic* phrases of the said antique four *parapegmata*. On my compiled drawings you can therefore compare the positions of both the *parapegmatic* phrases as found on the archaeological remains with the *parapegmatic* sentences of the 4 scientists-poets of antiquity.

Two *parapegmatic* sentences of the *Euctemon Parapegma* (430 BCE) perfectly coincide with the phrases found on the Augustus Meridian Line - saying "*Ethesian winds cease*" with a difference in advance of 12 days-degrees in the Zodiac. The *parapegmatic* phrase "*Summer begins*" with a difference in advance of 2 days-degrees.

A *parapegmatic* sentence "*boreas pnei*" (the wind *boreas* blows) has been related by a medieval source (*Pomponio Leto*) as having been seen in a cellar near the Obelisk, albeit in a wrong context. In the *Euctemon Parapegma* a similar phrase (*Epipnei boreas psihros* – the chilly wind of Boreas blows) is connected to the 14 degree of Pisces. The *Callippu*s *Parapegma* reports the exact same sentence "*Boreas pnei*" at the 30 degree of Pisces. You can also find a similar phrase in the *Eudoxus Parapegma* at the 4 degree of Pisces.

In Figs. 10, 11 I give the Meridian Line with my completion of the *parapegma* of *Euctemon*. In case of future discoveries the scholars could be helped by evaluating some possible coincidences.

*A huge Horologium for all the antique hours*

The question of a never existed huge Horologium, 400 meters wide, arose in 1650 about 350 years ago, when a German Jesuit, *Athanasius Kircher*, published a drawing, see Fig. 12.

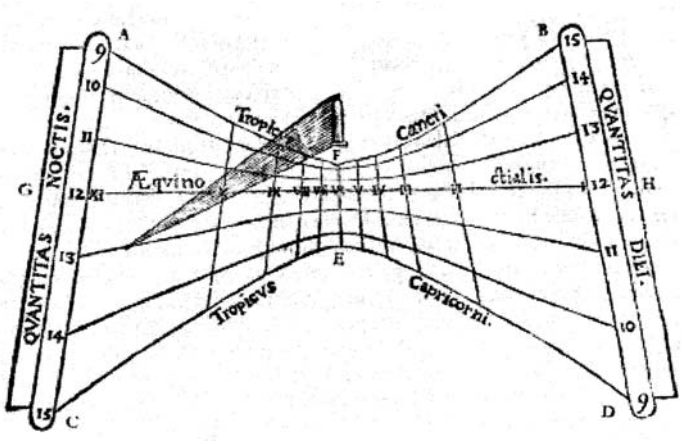


Fig. 12 – The huge Horologium imagined by *Athanasius Kircher* (1650) has fascinated many scholars throughout the centuries but it has never existed, except of course for the Meridian Line.

[4] arch. *Giovanni Antinori* directed the reconstruction of the Obelisk for Pope Pius VI (1792).

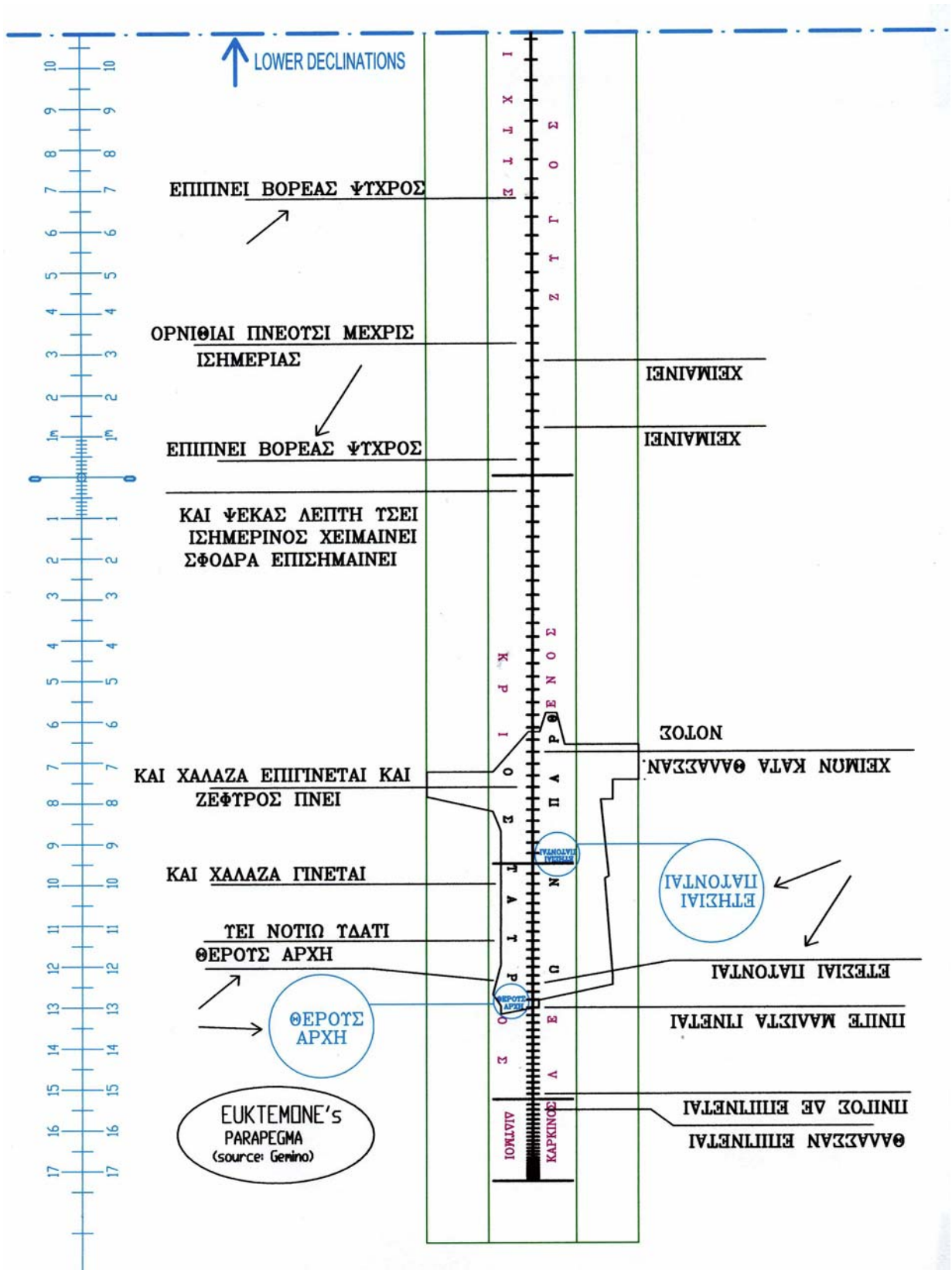


Fig. 10 – *Buchner*'s discoveries completed with E*uctemon's* parapegmatic sentences (upper declinations)

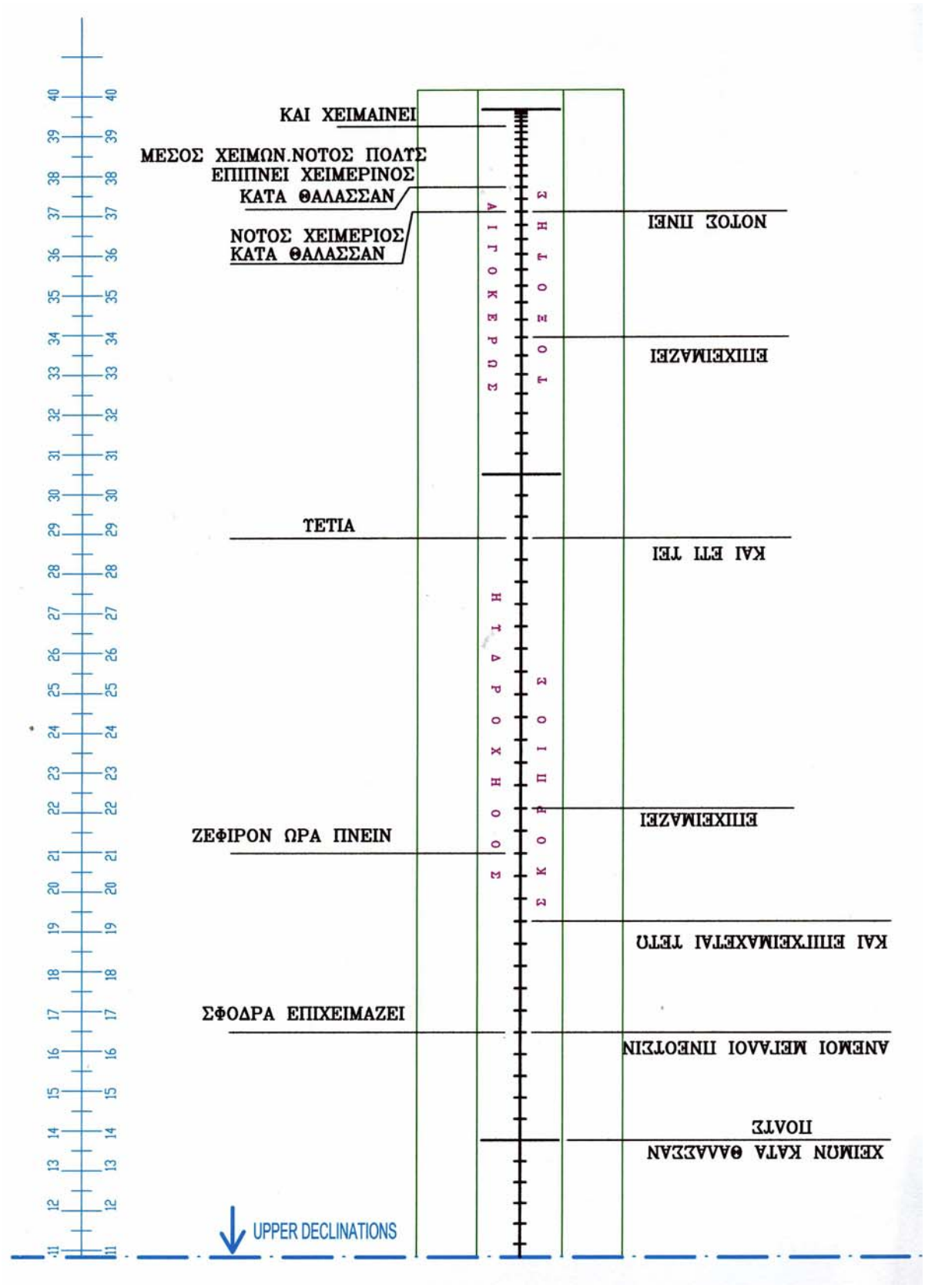


Fig. 11 - *Buchner*'s discoveries completed with *Euctemon's* parapegmatic sentences (lower declinations)

In this drawing the Obelisk projects its shadow over an enormous horizontal sundial of antique hours. The length of days and nights during the year have been written on the lines of Hour 1st and 11th, in Arabic (!!!) numerals unknown at that time. Nobody had, previously, ever assumed a similar hypothesis. *Pliny* himself, who has been an eyewitness himself, explicitly cites only the midday "*...sexta hora paulatimque per regulas...*"; "sexta hora" means in Latin exactly what the twelfth hour is for us (a Meridian Line).

Kircher *at times also published many complicated imaginary devices which belong rather to the history of science fiction than to the history of science or technology: e.g. the "*protheus catottricus*", a device which transforms men into beasts. If you are fascinated by* Kircher*'s imaginary machineries you have to seriously primarily doubt of their effective utility and secondarily of their material realizability by means of the technology of that time. You are obliged to conclude that he sometimes let his imagination run free - perhaps having in mind to fascinate and impress powerful persons to whom his works where dedicated.*

A more precise conjecture could be made since this drawing was printed in Kircher's book Obeliscus Pamphilius, which was erected in what is now Piazza Navona under Kircher's direction under assignment by Pope Innocent X (Pamphili). It is also notable that the same Pope assigned him to do an inspection of the wrecked pieces of the Obelisk of Augustus on the Mars Field. Maybe, encouraged by the assignment for the inspection, he invented the drawing of the Horologium in order to fascinate the Pope and obtain an assignment for possibly re-erecting it.

The hypothesis of Kircher's *Horologium* was been examined at length by two scientific seminars. In both cases the verdict was that the gnomonic device described by *Pliny* was a Meridian Line and NOT a sundial for all the hours.

The first seminar took place in Vienna in the year 1706 (prof. G.C.Müller; Prof. J.W. Bayer). The conclusion was to apply to *Kircher* the following proverb: *...quandoque dormitat Homerus...* which means that even the great poet sometimes dozes!

The second seminar was only epistolary (1750), meaning that a letter was sent from Father *Angelo Bandini* to the biggest names in science and erudition in Europe of that time; F. *Bandini* was entrusted with this task by Pope *Benedict XIV*. They were asked to give a personal opinion on the question: Was the gnomonic device cited by *Pliny the Elder* (70 AD) a *Horologium* for the whole day or a Meridian Line? Among the 13 scientists and erudite peoples were the important Astronomer *R. Boscovich* and the famous mathematician *Euler* - one of the biggest scientists of all time.

All of them answered that *Pliny* intended to describe a Meridian Line and not a sundial for all the day. Only one of them, Don *Alberto Colombo* a professor of Mathematics at the University of Padova, did suspend his judgment, saying that he wanted to wait and see some future archaeological remains. He would certainly answer the same way as his colleagues if he could have had available the reports of Prof. *Buchner*'s excavations (1979/80) : in fact no trace of a *Horologium* has been found north of the site where the Obelisk was erected and found, but only a Meridian Line, 10% of it!

If the brilliant minds of that time declared themselves contrary to the *Horologium*, it is inside *Pliny's* text itself where we must investigate to find the reasons. Let us not forget that Pliny the Elder was an eye-witness; furthermore his competence was at the highest level at that time.

The main reason is that *Pliny* cites in a very precise way a certain pavement fit to receive a certain shadow at a certain hour of the day. Well…which is the shadow that is explicitly cited by *Pliny*? The shadow of the winter solstice (*brumae confectae die*) at midday (*sexta hora*); he even declares that the pavement itself (*strato lapide*) was projected to receive the vernal shadow when it was at its maximum length at midday. Nothing more and nothing less than a Meridian Line!

*Pliny* could not imagine that the Meridian Line could had been completely submerged by the flooding of the Tiber making the Meridian Line unreachable, or that some edifices would be built over there, or that

the Obelisk would be razed to the ground by an earthquake. Therefore we cannot really blame him if he did not specify that outside of the Meridian Line there existed only the …. Mars Field!

Unfortunately two important scholars of topography of antique Rome have in modern times imprudently traced the drawing of a huge *Horologium* in the zone where the Obelisk was excavated. They did not possess any archaeological findings but nevertheless in their "Forma Urbis" the *Horologium* seemed to be really built in the form of a huge "butterfly" with wings 400 meter wide!

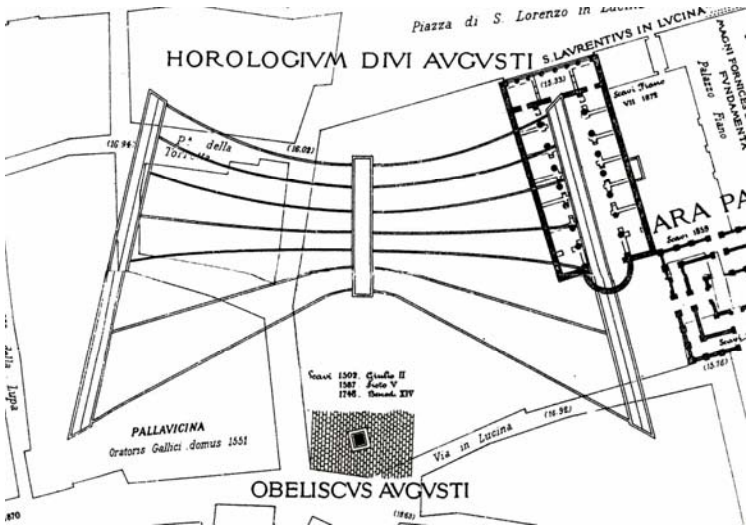


Fig. 13 – The upside-down (North –South) drawing of the (never existed) *Horologium* of Prof. *Lanciani* (1893-1901)

*Rodolfo Lanciani* was a very important Professor of antique Roman topography. His *Horologium* (published 1893-1901) which never actually existed, was merely copied from *Athanasius Kircher'*s drawing (see Fig. 13).

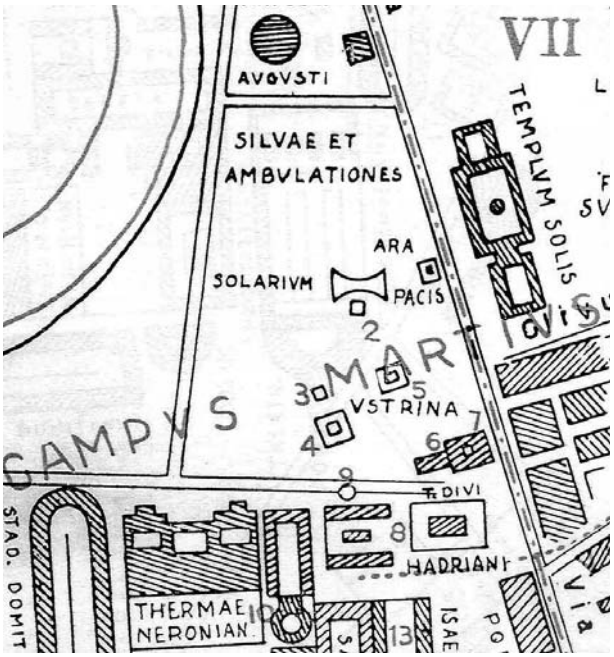


Fig. 14 – Prof. *Lugli's* drawing (1939) corrected some errors of *Lanciani* but he still suggested the existence of a huge *Horologium* instead of a Meridian Line.

Now, in modern maps northern objects are drawn upside and southern down but not at time of *Kircher*: so in his drawing the sundial has been drawn upside-down. *Lanciani* copied the sundial not evaluating such a difference. The line of the "*hora prima*", necessarily overturned, seems to be put in relation with the map of the Church of San Lorenzo in Lucina: the designer of the plan seems to be wrongly influenced by some archaeological remains which could support this connection, but these remains do not exist. Furthermore the hour-lines are absent. Prof. *Buchner* was then also influenced by *Lanciani*'s map: this is evident/explicit in his first paper of 1976.

*Giuseppe Lugli* held the same professorial chair as Prof. *Lanciani* (Topography of Ancient Rome). He published his plan of Ancient Rome in 1939. See Fig. 14.

His *Horologium* seems to be inspired by the wrong *pelecinum*[5] (two bladed axe) but to say the least it does not resolve the problem of an upside-down drawing.

[5] The term *Pelecinum,* as has been recently demonstrated, has to be reserved to a vertical sundial with two dihedral stone-faces. See [ALBERI AUBER 2008]. If Prof. *Lanciani's* "butterfly" is drawn upside-down, then prof. *Lugli* delineated a symmetric north-south sundial. He thought to resolve the "problem" of the north-south orientation of Kircher's drawing: nowadays, as has already been said, the top of the sheet normally indicates the north.

When Prof. *Edmund Buchner* (1923 –2011) published his first article (1976) on the obelisk and the hypothesized *Horologium,* he was surely influenced by Prof. *Lancian's* and Prof. *Lugli's* authoritativeness ([BUCHNER 1976] p.7). In any case he has the big merit of having found the financial means for, and organized and published the excavation's results of Via del Campo Marzio (see Fig. 1 in the first part of this article).

He has another credit: he used (1976), maybe for the first time, the antique mathematical algorithm "*Analemma*" in order to design drawing sundials with the new technologies (computerized design). The fact of having used these instruments for the "wrong" purpose of projecting a never existed *Horologium*, does not diminish his merit. ([BUCHNER 1976] p.8)

Unfortunately the hypothesis of *Kircher*, already abandoned by the authoritative scholars in the 18th century, thanks to Prof. *Buchner's* articles/books, gained a very wide popularity among gnomonists, archaeologists and generally among scholars since the 1980's. More recently, thanks to a group of serious scholars like *Schütz, Maes, Ferrari, Heslin* and maybe thanks to my efforts ([ALBERI AUBER 2011-2012], this hypothesis seems to be now supported, with rather weak arguments, from a group of scholars getting smaller and smaller.

*Rebuilding the Obelisk with a correctly connected Meridian Line*

After having so deeply investigated the Obelisk and the Meridian Line, despite the efforts I made in order to reach some stable points on the matter, I am not able to draw an unequivocal conclusive reconstruction of the gnomonic complex. The difficulty mainly stems from the uncertainty of the height of the projecting sphere (2960cm, say 100 roman feet...or 3034 cm?).

It is very disappointing for me to conclude my study without a plausible reconstruction of the gnomonic complex. Therefore after having accepted the calculated theoretical gnomonic height as recognized by the antique Greek scientist, I was obliged to make some hypothetical choices: first I assumed that the spacing out rod on the tip was 100 cm (85.5 without the bronze feed); second I eliminated the bronze feet as spacing out devices; third I imagined, in this hypothesis, that the Meridian Line was *lower* than the plane of the large square basement of the Obelisk, in order to have in this reconstruction a calculated distance of the Meridian Line to the center of the sphere. The reasons for these choices lie inside some doubts of mine upon a perfectly unitary project "ARA Pacis – Obelisk – Meridian Line", which is usually on the contrary commonly given as an unquestionable postulate. There is another possibility: do not exclude the possibility that the remains Buchner found were simply the original Augustus Meridian Line and that it never moved from its original position. On these doubts I am still investigating and maybe a new project with the 100 Roman feet could be published.

In Fig. 15 I show the Obelisk and its shadow at noon projected on the Meridian Line

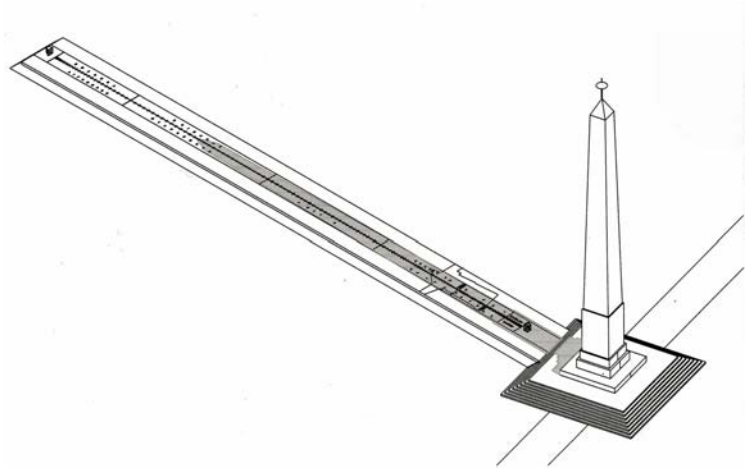

Fig. 15 – My reconstruction of the *Augustus*' Obelisk and of the Meridian Line (assonometry)

In Fig. 16 the same reconstruction is in connection with, first, the famous monument *Ara Pacis Augustae* and, second, with the *via Lata* (*via Flaminia*) which both have in common with the Obelisk, the same orientation (15° West) described by Vitruvius as a "Hellenistic" orientation (see [ALBERI AUBER 2006]).

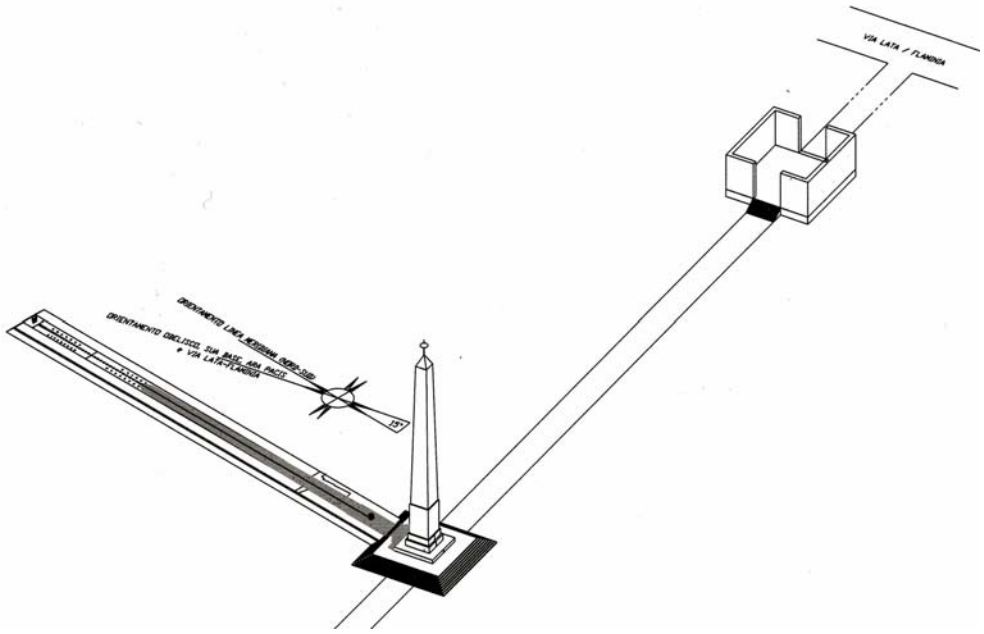


Fig. 16 – The Meridian Line is obviously oriented north-south while the Obelisk, the *Ara Pacis Augustae*, and *Via Lata (Flaminia)* are oriented 15° West. The 15° angle of orientation belongs to a Hellenistic tradition (*Vitruvius*).

Many questions frequently asked by many scholars regarding any ideological connections of the Obelisk's shadow with the *Ara Pacis* belong to studies for which I do not feel qualified.

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