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ON THE ORIGIN OF ITALIAN RENAISSANCE RADIO CENTRIC CITIES

A GRAPHICAL REVIEW

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ABSTRACT

From mid-fifteenth century to the first third of the sixteenth century, several architects proposed novel radio centric urban layouts in the north of Italy.

*There is lack of agreement between scholars on the origin/sources of these radio-centric layouts. Broadly, we can divide them into two groups. The main group of scholars asserts Vitruvius' *De Reaedificatoria* was the main source of these designs. However, a smaller and more differentiated group, points out to several other sources, including both Greek and medieval sources. In this brief communication we compare these two approaches, pointing out to the greatest consistency of Greek Sources, and specifically, to Plato's dialogues as origin of these radio centric layouts.*

Keyword: *Vitruvius, Ideal Cities, Italy, Renaissance, Plato*

Introduction

During the fifteenth and sixteenth centuries, Italy saw a 'Renaissance', i.e., a 'rebirth', of the culture and architecture of the 'Antiquity'. This rebirth was made possible by several issues that converged at the same time (Chueca Goitia, 1978; Morris, 1975; De la Croix, 1960):

- In the first place, the 'discovery' around the year 1412-1414 of a copy of Vitruvius' *De Architettura*, a book which acquired a magical aura and became a 'source of the knowledge of the Ancients'.
- Secondly, the invention of the printing press by Gutenberg (around 1440-1450), which made possible both the printing and diffusion of the Vitruvian text (first printing ca. 1486) and the drafting and publication of numerous *Tratattos* by the artists, architects and intellectuals of the time.

Italian Renaissance was a period of intense artistic and architectural creation. The arts and building design found inspirational models in the Vitruvian text, and the lack of illustrations could be solved by contrasting Vitruvius guidelines with the classical works and ruins that had been preserved in Italy. However, the models adopted by the architects for urban design can neither be so clearly traced to the Vitruvian text, which ambiguous guidelines could not be completed with any available examples (Chueca Goitia, 1978)

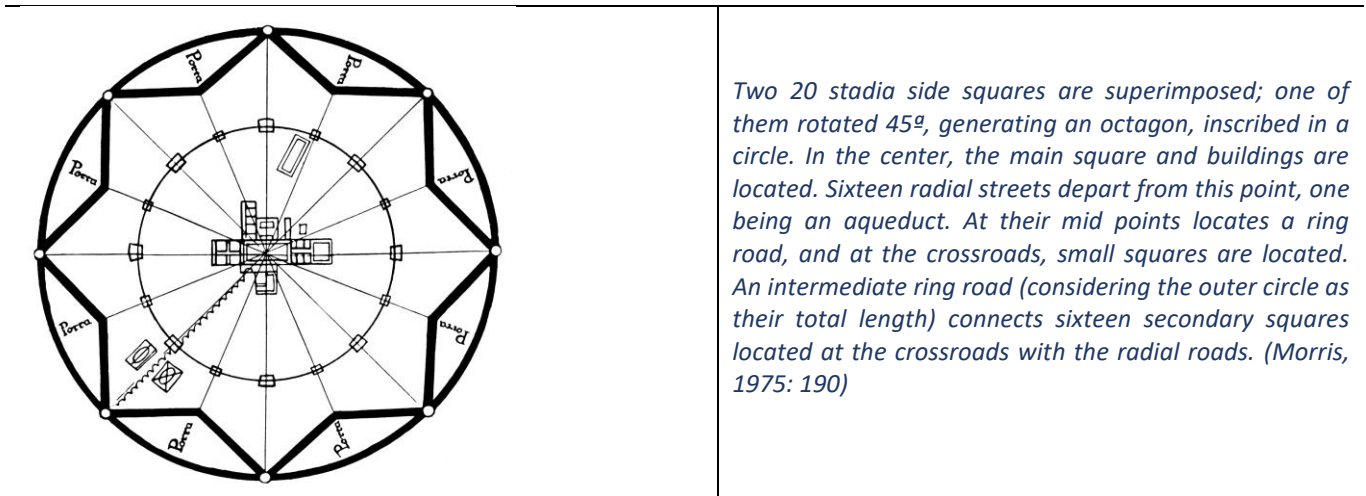
This makes especially interesting the review of both the ideal city proposals that were made at this time, and the search for the sources on which these urban planners inspired.

The Ideal Cities of the Early Italian Renaissance

A first contribution to urban design was Alberti's treatise *De Re Aedificatoria* (ib., 1452). The author followed the ten books structure of Vitruvius' text. Alberti did not proposed an ideal city, but rather stated a set of recommendations to follow in the design of cities, which were related to the location, type of political system, ..., and which could lead to very different city designs. In order to achieve that goal, he inspired in Vitruvius treatise, but completed it with the best knowledge of the Ancients.

After this contribution, the first radio centric ideal cities were proposed. The first proposal was the ideal city of Sforzinda (Averlino, 1464). Averlino's *Trattato de Architettura* was divided in two parts. In the first part (books I to XII) he described Sforzinda; a city to be built near Milan. In the second part (Books XIII to XXIV) he described Plusiapolis, an old city described in a Golden Book.

FIGURE 01_ THE CITY OF SFORZINDA



Around 1495, Francesco di Giorgio wrote *Trattato de Architettura Civile e Militare*, being the first Renaissance architect who detailed the organization of the radial city (De la Croix, 1960; Morris, 1975). He was concerned with the weakness Italian cities' defensive walls had shown in 1494 against the new artillery with steel projectiles of King Charles VIII of France. He aimed to develop novel more resistant designs, which could not be inspired in the Antiquity, since the Ancients did not know modern artillery. Di Giorgio asserted the defensive capacity of the cities no longer depended on the thickness of their walls, but on the plan of their fortifications.

FIGURE 02_ RADIAL CITIES

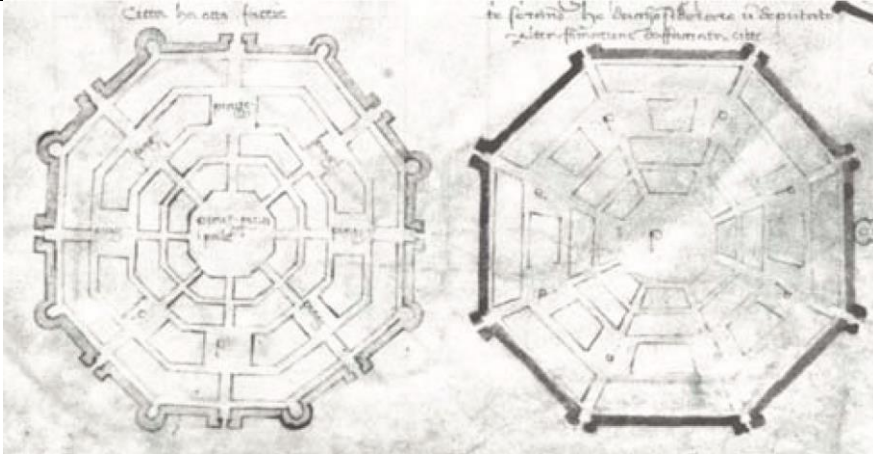
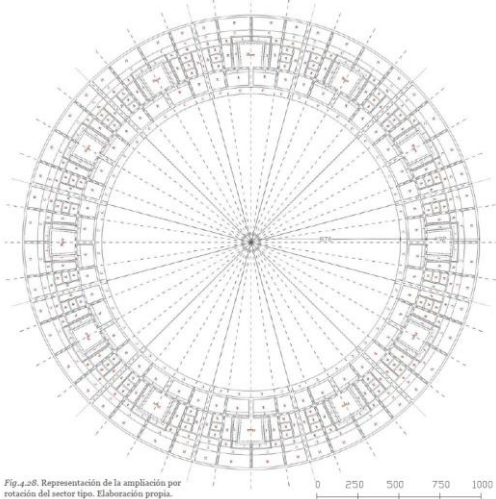


Image Source: Hidalgo, 2014:216

Around this same time (ca. 1490) Leonardo da Vinci, maybe influenced by Di Giorgio's proposals (De la Croix, 1960), proposed an expansion of the city of Milan, generating a kind of radio-centric ring based on repeating 12 times a sector organized around a central square (Solera, 2018).

FIGURE 03_ MILAN EXPANSION



Graphic reconstruction of Leonardo's proposal for the expansion of Milan (Author: Solera, 2018: 85)

Around 1527-1530, Baldassare Peruzzi publishes his *Trattato de Architettura Militare*. He largely repeated the city proposals of Francesco di Giorgio (of whom he had been a disciple).

In 1554, Pietro Cataneo -disciple of Peruzzi- published his *Quattro libri dell'architettura*. Francesco di Giorgio Influence, probably received through Peruzzi, can be seen. But he differs from previous authors, since he abandoned the radio centric streets network; all the cities he proposed had an orthogonal grid. Also, the great development reached by the wall and defensive bastions is evident.

FIGURE 05_ RADIAL CITIES

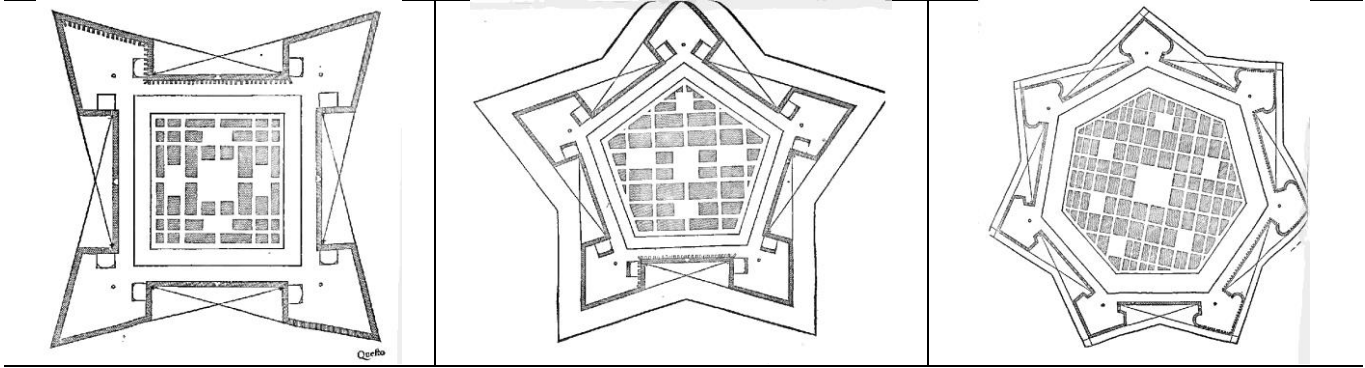


Image Source: Cataneo, 1554

The designs of Cataneo mark an end to radio centric cities designed by architects in north Italy (De la Croix, 1960). And it becomes most interesting to review the origin of these radio centric layouts.

Two Theories on the Origin of Sforzinda and North Italian Radio Centric Cities

There is currently lack of agreement on which was the origin of the radio centric layouts of these Ideal Cities proposed in the north of Italy from mid fifteen to first third of the sixteen century. Since these layouts started with the city of Sforzinda (Averlino, 1464), we focus on its possible sources according to several authors¹. Broadly, these sources can be divided into two groups which stand as conflicting hypotheses:

- The first and most largely accepted hypothesis is that their origin lies on Vitruvius' *De Architectura* (e.g., Morris, 1975; Whittermore, 2009; Hidalgo, 2014...).
- The second hypothesis, is that it draws on several influences, both located in Plato's dialogues (Onians, 1971); in several middle Ages authors (Lang, 1972), and in Alberti (Lang, 1972; Gunther, 2009).

In this brief communication, we graphically review both hypotheses finding available information sustains the greater consistency of the second.

Vitruvius Urban Layout as Origin of the Italian Renaissance Radio Centric Cities

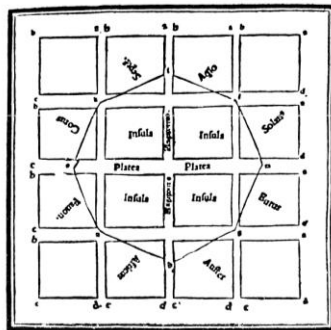
Vitruvius text was fundamental to Renaissance architects. Yet, most of its recommendations address the design of buildings, including only a few indications for the design of cities in Book I of *De Architectura*. These recommendations related to the choosing of a suitable location for the city; how its defensive walls and towers should be built; and to the interior layout of the city. However, while experts agree in the interpretation of most of Vitruvius recommendations, there is wide discrepancy regarding the city's inner layout:

¹ For other sources to aspects of Sforzinda different from the radio centric layout, refer to Lang (1972) and Günther (2009).

- Several authors (e.g., Morris, 1977; Whittemore, 2009; Hidalgo, 2014;...) argue that Vitruvius' proposed a radius-centric design; with a central square from which streets emanated following a radial structure, and a secondary structure of second order squares.
- However, other authors (e.g., De la Croix, 1960; Chueca Goitia, 1976) argue that Vitruvius' description is imprecise and susceptible to very diverse interpretations, even in the form of a grid.

This issue is fundamental, since if Vitruvius did not propose a radio centric design, the hypothesis that his book was the source for radio centric ideal cities is severely weakened. To shed some light on the issue, below we review the very different graphical interpretation different authors have made of Vitruvius' indications on the internal layout of the city.

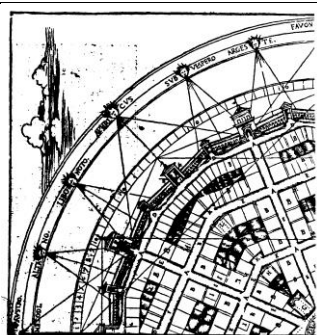
FIGURE 13- INTERPRETATIONS OF VITRUVIUS' IDEAL CITY



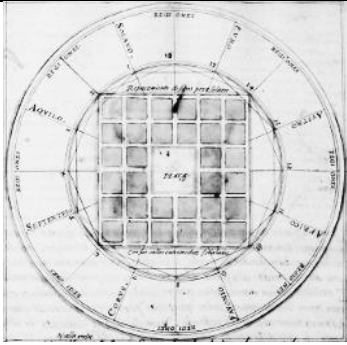
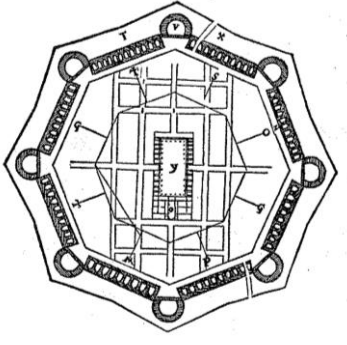
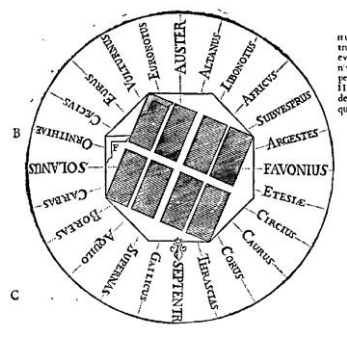
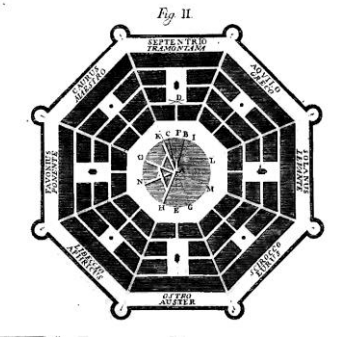
The first known illustrated translation of Vitruvius' city is Fra Giocondo (1511). He interprets it as a grid pattern, similar to the Roman colonies at the time.



Cesare Cesariano, 1521 (Source: De la Croix, 1960).



Caporali, 1536 (Source: De la Croix, 1960)

	<p><i>Velasco, 1554 (Source: Hidalgo, 2014)</i></p>
	<p><i>Daniel Barbaro-Palladio, 1556</i></p>
	<p><i>Coignard-Perrault, 1584</i></p>
	<p><i>Galiani, 1758</i></p>

The above review shows several relevant issues.

Firstly, we see the first interpretation of Vitruvius' urban network (Fra Giocondo, 1511) was not radio centric but orthogonal, while the first radio-centric graphic interpretation of Vitruvius' city (Cesariano, 1521) was made after Filarete (1464) and Di Giorgio (1490-1500) urban proposals were made. This sustains the hypothesis that Vitruvius' description does not describe a radius-centric city, and that the process by which a radius-centric

form has been attributed to Vitruvius' ideal city has been by reinterpreting his text according to the previous experience of the Italian cities of the Renaissance (De la Croix, 1960).

Secondly, the illustrations show a pattern underlying the interpretation of the form of the Vitruvian city.

- The first illustration (Fra Giocondo, 1511) shows a grid, similar to those used in Greek colonies after the Macedonian period and new Roman cities and military camps.
- The next two illustrations (Cesariano, 1521 and Caporali, 1536), show radius-centric cities, the first with a street layout reminiscent of Alberti's proposals for winding streets, and the second largely repeating a 36 years earlier proposal by Di Giorgio.
- From 1550 to mid-eighteenth century, it is interpreted as a circular city with an orthogonal grid. Only a central plaza is contemplated, with no secondary squares.
- In 1758, Galvani proposes a radio centric interpretation with secondary squares, very similar to the proposals of Di Giorgio and Peruzzi. This interpretation will later be accepted by most authors.

Therefore, the review shows a flexible interpretation of Vitruvius' proposals. Each author seems to represent Vitruvius' city in a similar way to the form of the city whose suitability sought to sustain. However, from the second half of the eighteenth century, Vitruvius' city would have lost its role as pattern for new cities design, having from then on mostly a theoretical interest, and this would have allowed a new radius-centric interpretation almost mirrored to Di Giorgio and Peruzzi proposals, initiated by Galvani (1758). The ultimate intention may have been to endow the Italian Renaissance city with a noble origin, rooted in Antiquity.

The above challenges the hypothesis that Vitruvius was actually the origin of the radio centric city layout. Let us then review the second hypothesis.

On alternatives sources of Radio-Centric Patterns in Italian Renaissance Cities

Secondly, we review several alternative sources that have been proposed relating the radio centric layout of Italian Renaissance cities.

Firstly, Plato's ideas influenced Alberti, who cited both Plato's Atlantis (Critias, 360 bC) and Magnesia (Laws, 350 bC) into his *Re Aedificatoria*, and incorporated some of Plato's design proposals, as the subdivision the city into equal sectors each with its own facilities and public spaces (ibid., VII.1), or the optimality of the circular exterior form of the city. This treatise largely influenced later architects and urban designers.

Secondly, we find several Greek influences in Averlino's Trattato, which in turn allow us to suggest the influence of Greek radio centric cities on his ideal city of Sforzinda: the first radio centric city proposed at the time. In the second part of his Trattato he described *πλουσια πολις* (ib., 1464. XIV), Greek term meaning 'rich

city' (Plousiapolis). We find no reference in this city to roman architecture (Günther, 2009), yet many to the architecture and the city of Atlantis, that according to Plato had abundant wealth and Gold. Also, the buildings described by Averlino decoration remind Plato's Atlantis temples: stones of many colors, gold, silver and *orichalcum* or mountain copper (Onians, 1971). In addition, several Sforzinda measures resemble those of Atlantis. The city was inscribed in a 28 stadia diameter circumference (Averlino, 1464. 2), very similar to the 27 stadia perimeter of Atlantis, and its central plaza measured one stadium long by half a stadium wide, same as Atlantis central Temple of Poseidon (Critias, 116a).

We also find several issues that resemble Magnesia, such as the radio centric network of streets; the squares located halfway between the center and perimeter of the city (although in Plato's proposal, the squares were located in the space between the radial axes), and the references to the universe and the passage of time in the both Sforzinda cathedral and central tower, which relate to Plato's order of both the Universe and Magnesia (Timaeus and Laws, both analyzed in Alvira & Fariña, in press).

As more recent sources it has been suggested two influences on the two rotated squares inscribed in the circle pattern of Sforzinda (Lang, 1972):

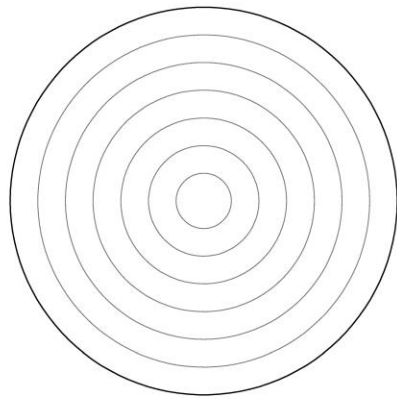
- Firstly, to Tacitus (V.11.3) description of Jerusalem and Alberti's (IV.3) treatise, who suggested that a round city with walls 'protruding and receding' was the most secure
- Secondly, the pattern appeared in some medieval treatises, e.g.; Gossouin de Metz's Image du Monde as the image of the world

Lastly, Whittemore (2009) and Günther (2009) suggested as Sforzinda source, the idealized radio centric Milan medieval with sixteen entrances by Galvano Fiamma (ca. 1338), same number as radius in Sforzinda.

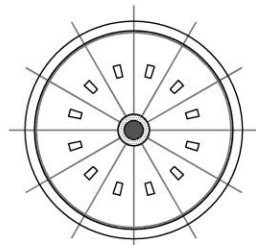
Thus, in the proposals of Di Giorgio (later developed by Peruzzi), we find a city scheme divided into equal radio-centric sectors by streets that radially emerge from a central square, each sector having a plaza in its center. This configuration could be influenced by both Averlino a Plato proposals.

And probably inherited from Di Giorgio's proposals, we find a similar scheme repeated in Leonardo da Vinci's proposal for the enlargement of Milan (ca. 1490), which is organized by 10-12 sectors, each one with a central square where the local market was located. Besides, the 5,000 houses 10 satellite towns proposed by Leonardo could be directly influenced by the 5,040 houses of Magnesia, as suggested by Mumford, 1961.

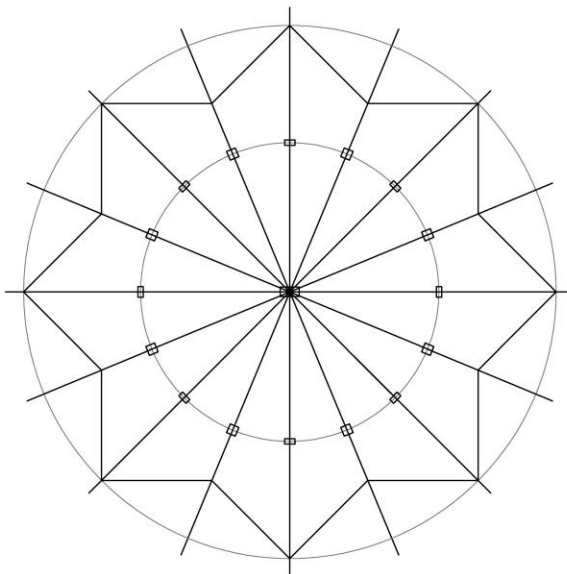
FIGURE 15_ GRAPHICAL COMPARISON OF CITES



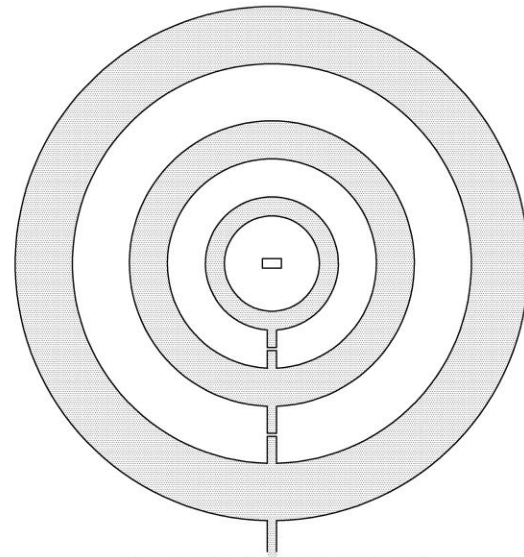
ECBATANA (HERODOTUS, I.98)



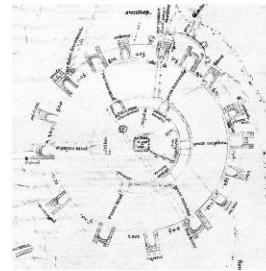
MAGNESIA (PLATO, 350 BC)



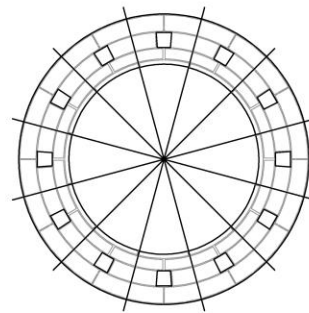
SFORZINDA (AVERLINO, 1464)



ATLANTIS (PLATO, 360 BC)



MILAN (FIAMMA, 1338)



MILAN EXTENSION (LEONARDO, 1490)

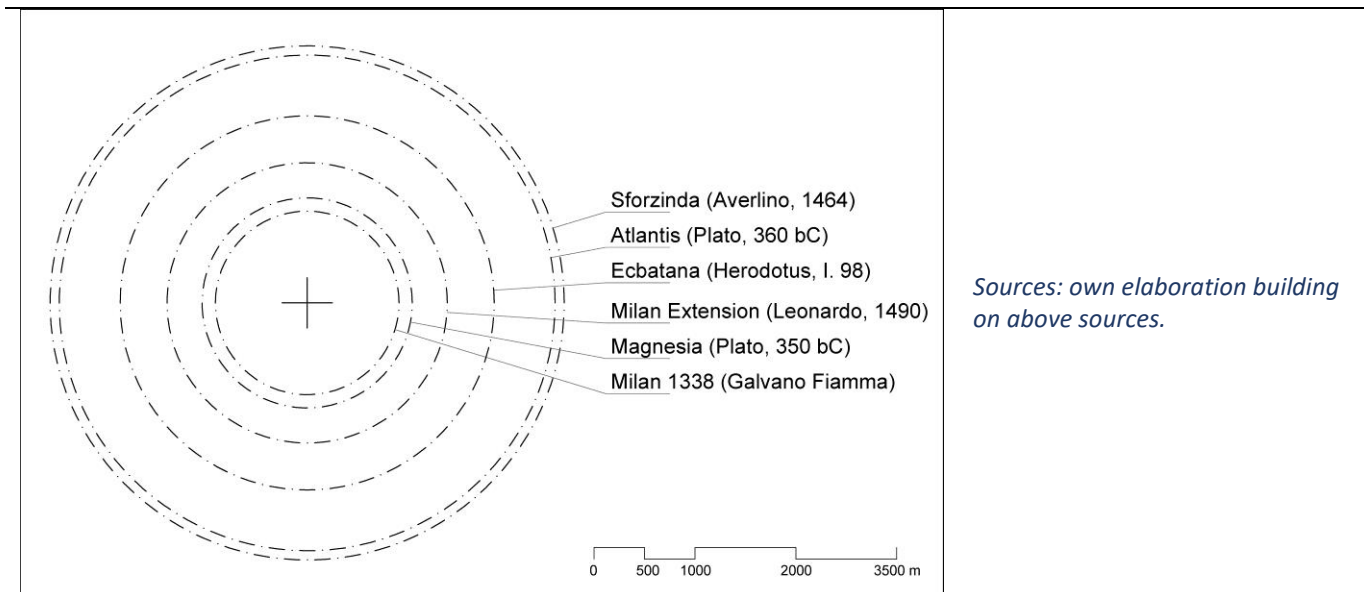
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Sources: Atlantis: own elaboration based on Plato (Critias). Ecbatana: own elaboration based on Herodotus (I.98). Magnesia: own elaboration based on Alvira & Fariña (in press). Milan: Galvano Fiamma (source: Wikipedia). Sforzinda: own elaboration based on Averlino (1464). Milan Extension: own elaboration based on Solera (2018).

It is also interesting to superimpose the size of above cities.

FIGURE 16_ GRAPHICAL COMPARISON OF CITES' PERIMETER



Above two figures show us the consistency of the hypothesis that both Plato's Atlantis and Magnesia played an important part on Averlino's conception of Sforzinda, and were later integrated into the radio cities paradigm of north Italy Renaissance architects.

Conclusion

In this brief communication, we have reviewed the novel radio centric cities that were proposed by the renaissance architects in the north of Italy from mid-fifteen century to mid-sixteen century. The origin of these radio centric layouts remains conjectural (De la Croix, 1960).

While the most accepted hypothesis links it to Vitruvius' treatise, it clashes with the fact there is still a strong debate as to whether the city's layout proposed by Vitruvius was radial or a grid. The facts that Vitruvius city has been illustrated as both radio centric and orthogonal grid; and that radio centric interpretations were later than the radio centric proposals of Averlino, Di Giorgio, Leonardo, and Peruzzi, allow us to consider that the influence may have been the other way around; i.e., that the translators reinterpreted Vitruvius' treatise on the basis of the Italian radio-centric cities, seeking to endow them with a noble origin in Antiquity.

On the other hand, the hypothesis that links it to other authors seems more consistent, standing both Plato's Atlantis and Magnesia, as most likely references. We have highlighted Alberti's references to both cities,

and many indications as well as the graphical review, point out to their influence in Averlino's proposal. This influence would be, directly or indirectly, picked up by later Italian urban designers.

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