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# Designing Vertical Circulation: The Lessons of the Monuments of Dendara

Pierre Zignani

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# Gestaltung, Funktion und Bedeutung antiker Treppenanlagen

Multiperspektivische Analyse  
einer transkulturellen Konstante

Herausgegeben von  
Alexa Rickert und Sophie Schlosser

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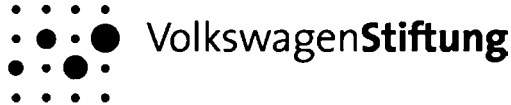
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Herausgegeben von  
Alexa Rickert und Sophie Schlosser

Zaphon  
Münster  
2022

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# Designing Vertical Circulation

The Lessons of the Monuments of Dendara

Pierre Zignani

## The site and the main sanctuary

Dendara was a regional capital of Upper Egypt since the beginning of Pharaonic times with the Goddess Hathor as its main divinity.<sup>1</sup> Geographically the site is located five hundred kilometers south of Cairo and fifty kilometers north of Luxor. The territory of the ancient city is still well preserved at the limit of the desert and fertile land which was watered by the Nile flood. The actual dimensions of the site are therefore much larger than the touristic area which corresponds only to the main *temenos* (fig. 1).

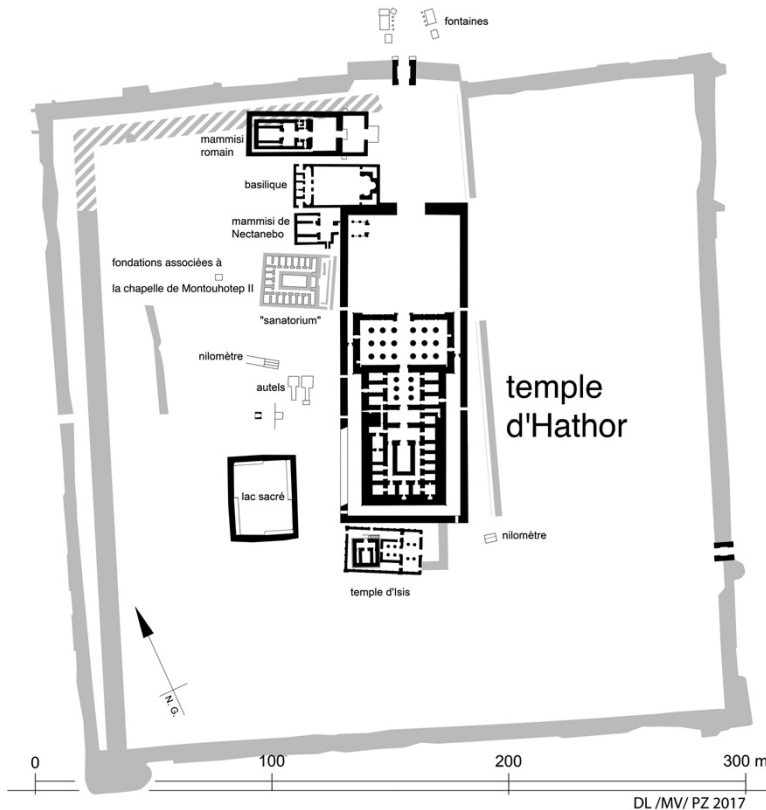


Fig. 1: *Temenos* of the sanctuary of Hathor at Dendara  
(plan by Damien Laisney, Matthieu Vanpeene and Pierre Zignani)

<sup>1</sup> Fischer 1968, 8–12.



Fig. 2: Dendara, temple of Hathor; exterior view from the west of the volumes of the *naos* and *pronaos* (photo by Pierre Zignani)



Fig. 3: Dendara, temple of Hathor; view from the apparition hall toward the offering room with a ramp in front of the axial door (photo by Pierre Zignani)

This sacred domain contains, around the main sanctuary, monuments and ancillary facilities, contemporary or older, necessary for its proper functioning. After the end of paganism, the transformation of the site into a Christian settlement

left the remains of two Christian churches inside the Hathor's precinct. In fact, Dendara preserves a large part of its ancient territorial metropolis spaces including, on nearly two kilometers long (one kilometer wide), an urban area, a vast necropolis and a second *temenos*, whose sanctuaries' foundations are under the cultivated land.<sup>2</sup>

The building of the main sanctuary, dedicated to the goddess Hathor, was founded in July 54 B.C.<sup>3</sup> It belongs to an architectural heritage that had been in use for more than three millennia. The temple is the renewal of an older program that certainly merges with the origin of the city. The construction of such a building tried to model the ideal world of the god. Its proper activity was seen as a guarantee of the balance of the human environment. Thus, it was not a space of collective and popular celebration but a very exclusive place where the god resided on earth. So the architectural structure was very closed to protect the privacy and the activity of the god. In plan, the temple has a concentric composition around the *cella*, the Holy of Holies. It has been interpreted as a principle of protection of the sacred against the outside from where the potential for a threat of chaos exists.<sup>4</sup> It should be noted that the spaces have been organized according to rigorous grids, which is confirmed by the accuracy of the actual measurements compared to those of the texts. Despite an excellent state of conservation of the *naos* and *pronaos*, the project for the temple renewal was never finished like in Edfu. A stone peribolos wall was begun but never completed, as well as a forecourt and a pylon, which remained in the state of foundations. From the outside, the *naos* and *pronaos* present elementary shapes that do not reflect the complexity of the organization of the interior spaces (fig. 2). The dimensions of the constructed parts of the temple project measure more than eighty meters in length with a width of about forty meters and a height of almost twenty meters. The *naos* is a composition of about forty rooms of different sizes, to which must be added many crypts. The concentric order is cut by an axis, more precisely, a linear expansion of its core towards the outside. This geometric direction corresponds to a festive function of the movement of the deity, when it, or more precisely its portable statue, occasionally leaves the protected and perfect universe of his sanctuary to go towards the world of men. It is expressed by a double homothety in plan and in section.<sup>5</sup> In the few cases where the scientific community has accurate architectural documentation, this configuration can be observed in almost contemporary sanctuaries of great size, such as the temple of Kalabsha<sup>6</sup> in Nubia, the

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<sup>2</sup> Zignani 2010, 53–79 pl. 2.

<sup>3</sup> Zignani 2010, 35–46.

<sup>4</sup> Zignani 2010, 94–99.

<sup>5</sup> Zignani 2010, 231–236.

<sup>6</sup> Siegler 1970, 57 pl. 10. Even if the author does not mention it, the lines of a homothety can be also reproduced on his plan (pl. 4).

sanctuary of Repit at Athribis<sup>7</sup> and the temple of Soknopaiou nesos<sup>8</sup> in Fayum. The result of this design with an expansion of the space is also a hierarchy of rooms with common floor and ceiling levels, thus producing groups of spaces with differences in elevation.<sup>9</sup> It is interesting to note the use of ramps in front of the doors of the central axis, while the secondary circulations for daily use have only one step for a similar difference of height (fig. 3). Ramps are also used as access from outside for daily worship.<sup>10</sup> Beyond their easier use, one may wonder if the access ramps do not connote a hierarchical expression of a formal passage.

### Staircases

The cyclical ceremonies or sacred feasts related to heaven, or special programs such as the Osirian chapels, required access to the roof of the sanctuary.<sup>11</sup> The important difference in level required a long development of steps to reach the roof of the temple (fig. 4 and fig. 5). The main staircases of the temple of Hathor, like in the other large sanctuaries of the Greco-Roman period, correspond to two typologies:<sup>12</sup>

- the quadrangular helical plan with corner landings (see X on fig. 4 and fig. 5),
- the straight flight (see W on fig. 4 and fig. 5).

It should be noted that the last great temples will integrate this linear staircase into the framework of the crypts inside the outer walls of the *naos* (fig. 6).<sup>13</sup> There are also various minor staircases connecting the different levels of the *naos* terraces which provide access to another important flight of stairs leading to the roof of the *pronaos*.

### Masonry details

These different staircases show several structural systems. The stairs leading from the *naos* to the *pronaos* have steps which were cut from blocks that were cantilevered into the wall masonry.<sup>14</sup>

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<sup>7</sup> Zignani 2017a, 6–7 pl. 7.

<sup>8</sup> Davoli 2014, 52–53. 62–63.

<sup>9</sup> Zignani 2010, 161–171.

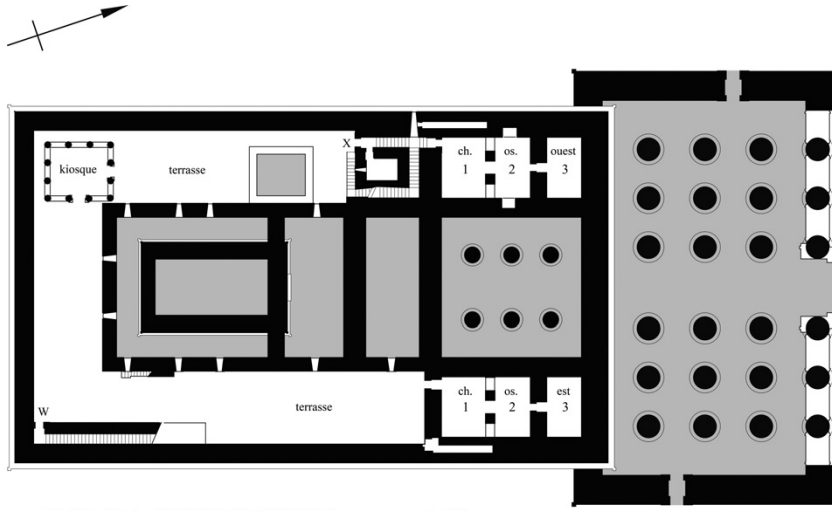
<sup>10</sup> Zignani 2010, 361 fig. 6/40–6/41.

<sup>11</sup> Zignani 2010, 130–139.

<sup>12</sup> For an inventory of the main stairways in Greco-Roman temples, especially for the large temples of Upper Egypt, Edfu, Kom Ombo, Armant, Athribis, Dendara see: Rickert 2017, 48–49. 51. 53–56.

<sup>13</sup> For the temple of Edfu see Traunecker 1994, 26–36.

<sup>14</sup> Zignani 2010, 144–145 fig. 3/61. pl. 26.



DENDARA, TEMPLE D'HATHOR, terrasses inférieures

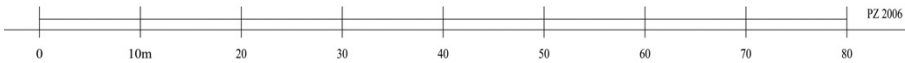
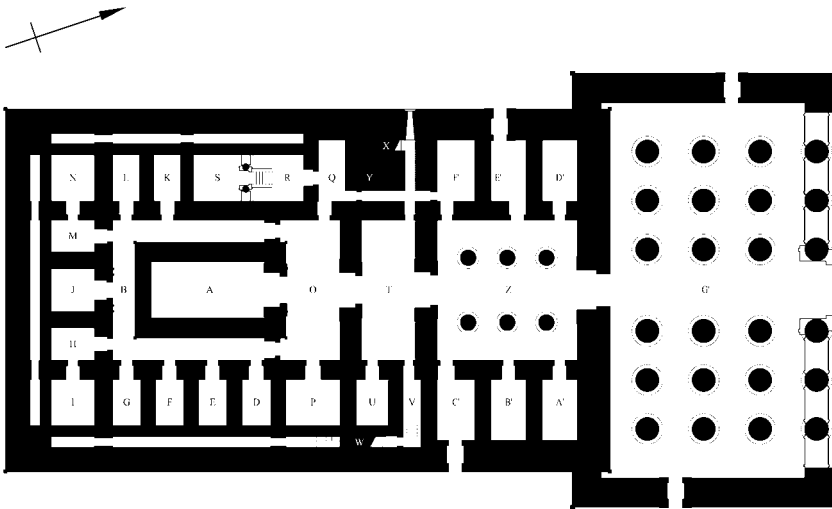


Fig. 4: Dendara, temple of Hathor; lower terraces on the roof of the *naos* (plan by Pierre Zignani)



DENDARA, TEMPLE D'HATHOR, niveau sol

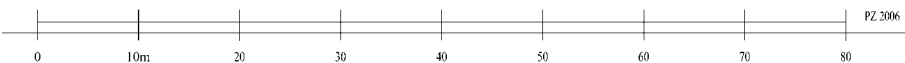


Fig. 5: Dendara, temple of Hathor (ground plan by Pierre Zignani)

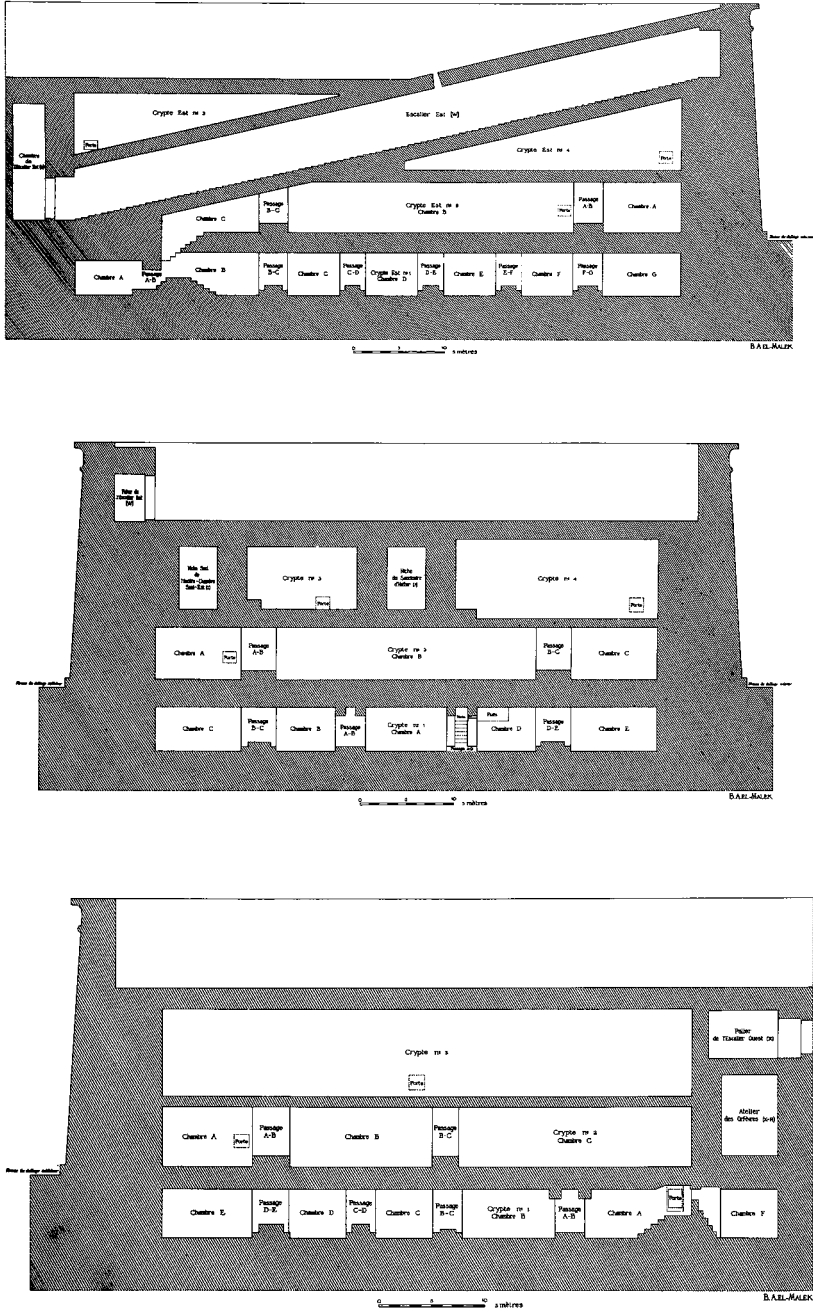


Fig. 6: Dendara, temple of Hathor; longitudinal sections through the honeycomb system of crypts in the outer walls of the naos; at the top, the eastern side with the longitudinal staircase integrated into the crypt grid (after Chassinat 1947, pl. 319–321)

In the case of stairs between two walls, like in the wall crypts, the masonry of the supports follows the slope and the cover slabs are rectangular parallelepipeds. This is not the case with helical staircases, where some parts around the corners are made of huge monoliths whose thickness allows them to be both the ceiling and the upper landing as well as its steps. This situation is well illustrated by the roman *mammisi* (birth house) because its masonry is partly dismantled around the staircase (fig. 7).<sup>15</sup> This construction, almost contemporary with the temple of Hathor, has only one main staircase but on a helical plan. Its architectural program had another function than a sanctuary where a deity resided. Thus, there are no crypts integrated in the thickness of the walls but only in the height of the side rooms.<sup>16</sup> There seems to be great divergence in the composition despite a common architectural vocabulary but the study on how to design such a temple remains to be done. Nevertheless, its dismantled state allows for good documentation of the masonry work for the staircase. The dimensions of the corner blocks are much larger than the common stones of the masonry (fig. 8) and required a special order from the sandstone quarries located about 200 km to the south (Gebel Selsileh). This setting was also recorded for an older sanctuary built in granite: the temple of Behbeit el-Hagar (30<sup>th</sup> Dynasty).<sup>17</sup> At Dendara the staircase of the roman *mammisi* was also not completely finished in its decoration and the final cutting of the steps. This makes it possible to observe details of the work of the stone, in particular for the dressing of the finished surfaces. The second to last upper preserved landing is particularly instructive as it has a network of rectangular recesses in the rough face that mark the level to be reached for its finishing surface.<sup>18</sup> A similar procedure can also be seen on the side joints of the monoliths of the staircases which were originally set in the ashlar masonry. This procedure is common to the way of controlling the accuracy of the final shapes in almost all masonry operations: bedding surface, resting surface, adjustment of exceptionally large blocks, surface dressing.<sup>19</sup>

### **A key to the ancient perception of space**

The practice of the two main staircases of the temple of Hathor has allowed to approach the relationship of natural light in the space of the sacred completely different from our cultural heritage of a light victorious over darkness.<sup>20</sup> Many fields remain to be studied within Egyptology, notably on architecture, in particular on the ancient perception of the built space and thus its manner of conception.

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<sup>15</sup> For the plan of the roman *mammisi* see Borchardt 1938, pl. 2.

<sup>16</sup> Pieron 1910.

<sup>17</sup> Lézine 1949, 52.

<sup>18</sup> Zignani 2017b, 429, 411 fig. 23.

<sup>19</sup> Zignani 2017b.

<sup>20</sup> Zignani 2011.





Fig. 7: Dendara, view from the east of the Roman *mammisi* (photo by Pierre Zignani)



Fig. 8: Dendara, roman *mammisi*; detail of a corner monolith of the staircase (photo by Pierre Zignani)

Only few modern architectural historians have included Ancient Egypt in their fields of study. Among these, Siegfried Giedion in his research on the origin of architecture has even suggested that the interior space was neglected by the Pharaonic architects.<sup>21</sup> Without literally taking into account the functions associated by iconography and texts, the use of the two main staircases of the temple of Hathor led to some observations on the relationship between the space and the devices for bringing light, even if undeniably minimal. Until now, researchers have been interested in the use of these stairs in relation to the parietal representations that show the processions, especially that of the New Year's festival.<sup>22</sup> In the temple of Horus at Edfu the procession is ascending in the helical staircase and descending in the longitudinal one. At Dendara the walls of the two staircases show on one side an ascending procession and on the other a descending procession. This situation raises questions about the relationship between the temple's decoration and the real ancient activity within the monument. Thus, the Egyptologist Philippe Derchain has shown us that the statement of the decoration is a more intellectual and subtle game of a visionary than the account of a reality.<sup>23</sup>

The helical space of the western staircase leading to the terraces justified a special treatment to ensure a little light throughout the ascent or descent. With the exception of the three doors on the exterior of the *naos* (the axial gate and the two lateral accesses for the daily offerings), this is the only case of "window opening" in the elevations of the sanctuary. Each of the five landings towards the outside was the occasion to bring, through the façade, a lateral lighting in the axis of each east-west flights.<sup>24</sup> Due to the slope of the exterior elevation, each opening is singular despite the formal arrangement in elevation. They are grouped by the two landings tangent to the façade, although these have a different altitude. With similar openings, the angles of the prisms in the thickness of the wall are therefore all different. It would be wrong to reduce the shape of these openings only to the formalism of the façade. The solution is even more elegant when one considers the purpose of these particular geometries. This becomes apparent when studying the projections of the different cones of light in the particular space of the staircase.<sup>25</sup> The geometry of the devices allows the supply of light on the landings, opposite to the façade. Whether ascending or descending, those who take the eastern flight, opposite to the façade, are confronted with a passage in almost total darkness. The cone of light distributed by the openings nevertheless makes it possible to use this side of the staircase, since it illuminates the opposite landing and the edge of the last step (fig. 9). The illuminated surfaces allow to understand the

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<sup>21</sup> For example: Giedion 1964, 523 and Giedion 1978, 32.

<sup>22</sup> For a synthesis of these studies, see Rickert 2019, 404–407.

<sup>23</sup> Derchain 1989; Derchain 1990, 230–233; Derchain 2003.

<sup>24</sup> Zignani 2008, 94 fig. 3.22.

<sup>25</sup> Zignani 2010, 273–282.

inclinations and changes of direction of the helical space. The user is thus able to pass through the dark space, whether ascending or descending.

On the other side of the sanctuary, to the east, the staircase has been included longitudinally in the honeycombed grid of the wall integrating the crypts (see the upper section of fig. 6). Compared to the western helical staircase, the linearity of its space allows a progression with a lower luminosity.<sup>26</sup> This has made possible to reduce the lighting openings to a single zenithal element (fig. 10). When ascending, the cone of light indicates the direction and slope of the space. Then, the light that would filter around the door of the terrace would allow the user to reach the upper landing. The location of the unique zenithal opening is as far away as possible from the access from the terrace and coming from the very bright exterior, allows to be guided into the darkness. Beyond this element, the crypt program excluded any light from above. In the almost total darkness of the lower part of the staircase, two zenithal openings in the lower vestibule (V) provide more light than all the temple rooms which have only one. This situation allows the person descending in an increasingly dark atmosphere to perceive, shortly before reaching it, the landing and then the change of angle imposed on the path by the perpendicular location of the vestibule. There is, however, evidence of a door between the bottom of this staircase and the vestibule which, if closed, would make it much more difficult to go down.



Fig. 9: Dendara temple of Hathor; staircase (X), eastern flight (opposite to the façade): natural illumination of a landing (photo by Pierre Zignani)



Fig. 10: Dendara temple of Hathor; staircase (W), unique zenithal lighting allowing to understand the direction and the slope (photo by Pierre Zignani)

<sup>26</sup> Zignani 2010, 266. 271–273.

Considering these ascent spaces, the supply of natural light by openings seems to be conditioned by a minimal threshold brightness of the space authorizing the circulation. In this longitudinal staircase, a lateral supply with several openings would have been possible. It would have allowed a more intense and homogeneous lighting. It is clear that this was not the intention of the designers and it is more likely that they were trying to get just enough light to move. This choice of a zenithal device shows that the designers preferred a solution that avoided opening the external façade. This is undoubtedly linked to the architectural design that was seeking all solutions to preserve around the divinity the perfect balance of the interior in relation to an exterior from which a threat could come. This explains why the lighting openings of each space of the *naos* are on its terraces, sheltered by the high walls of the cornices.<sup>27</sup> Only the helical nature of the western staircase imposed openings in the western elevation to allow its use, with a minimum supply of natural light.

As a conclusion, I would like to quote the words of one of the first theorists of Western culture to establish the conception of the built space as a discipline, Leon Battista Alberti, with his book *De re aedificatoria*. He described stairs construction as extremely demanding in terms of effort and thought.<sup>28</sup> The intelligence and rigor of the relationships between staircase space, light and function demonstrate once again a global and preliminary conception of the architectural work that preceded the construction of the Egyptian temple in the Greco-Roman period.

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<sup>27</sup> Zignani 2010, 239 fig. 5/22.

<sup>28</sup> Alberti 2004, 91–92.

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