Abstract: The location and design of Roman cities, farmhouses and town houses took account of the climate, at least according to the works of several Roman authors spanning a period of about 500 years, beginning with Vitruvius’ De architectura. Issues considered included latitude, site selection, heat, solar orientation, winds and daylighting. Vitruvius emphasised health, an emphasis of regulatory building codes today, rather than comfort and amenity. Victor Olgyay, writing Design with climate in 1962, and addressing similar issues, was more interested in comfort. The two works are compared.

Keywords: Vitruvius; Olgyay; climate; design.

1. INTRODUCTION

Vitruvius’ De architectura (ca. 30-20 BCE) and Victor Olgyay’s 1963 classic, Design with climate, deal with design with climate – bioclimatic design – in part and wholly, respectively. In the absence of electrical and mechanical services, architecture in ancient Rome was obliged to take a passive approach to ventilation, lighting, heating and cooling, for health. Though Olgyay had access to electrical and mechanical services to achieve comfort in houses in different regions, he was interested in the possibilities of passive design, for comfort. He referenced Vitruvius at several points, which raises the question of a comparison between these two influential texts.

This pre-scientific Roman approach and the pioneering scientific approach of Olgyay are compared. The two books had a lot in common. Both discussed the effects of climate on man (e.g. Vitruvius 6.1.3-12; Olgyay, p. 14). Both refer to climatic response parallels in the plant and animal kingdoms. For example, Vitruvius provided an extensive rationale for avoiding heat and preferring cold, involving the weakening of organisms in summer but being invigorated by the cold (1.4.4), and the natures of animals with respect to the elements of heat, humidity, earth and air, because ‘good health is the essential prerequisite when siting city-walls’ (1.4.5-8). He recommended the examination of the livers of sacrificed local animals to determine if the food and water in a locale was healthy or not (1.4.9-10). Olgyay also explored climate and the plant and animal kingdoms (pp. 1-2, 53, and 84-85).

Both works recorded pre-existing ideas and suggested new ways forward, and were adopted (or not) by subsequent authors and architectural practice. Vitruvius was followed by Faventinus De diversis fabricis architectonicae (200-300 CE) and Palladius Opus agriculturae (ca. 450 CE). These books collectively give us an idea of how bioclimatic principles were considered in the Roman era over a 500-year period. They were in general agreement, if only because Faventinus’ book was a short epitome of Vitruvius, and Palladius in turn used this epitome for the architectural content of his book on farming. Olgyay in turn has been followed by numerous other authors up to the present day, a recent example being Szokolay (2014). Some others are given in Fieldson (2004).

2. LATITUDE

Vitruvius understood that the design of houses varied with the latitude:

‘Houses, then, will be correctly planned if, first, we take careful notice of the regions and latitudes of the world in which they are to be built. For it clearly makes sense that one type of building should be built in Egypt, another in Spain, some other type in Pontus and a different one again in Rome, and so on, depending on the different characteristics of the countries and regions’ (6.1.1).

This recognition of the importance of regional adaptation is quoted approvingly by Olgyay in Chapter I General introduction (p. 4) and referred to again when quoting Le Corbusier’s parallel recognition (p. 13).

Vitruvius had a basic understanding of why this was so:

‘The reason is that one part of the earth is oppressed by the trajectory of the sun, another is a long way from it and yet another, lying along the middle zone, is temperate. Therefore, since the position of the heavens relative
to the mass of the earth is naturally governed by the inclination of the circle of the zodiac and the course of
the sun, producing very different results, it is obvious that the siting of houses must be organized similarly
with reference to the characteristics of the region and variations of climate’ (6.1.1).

He discussed the zodiac and sunpaths in more detail in Book 9, but with respect to sundial design.

Olgyay dealt with regional variations in chapter III Regional evaluation. For four different locations – cold, temperate, hot-
arid and hot-humid – he produced bioclimatic charts mapping relative humidity against drybulb temperature, with a comfort
zone and lines for freezing, shading, sunstroke, heatstroke, and a limit of work of moderate intensity (equals limit of wind and
moisture), and curves for radiation, wind speed and moisture content. These charts were vastly more sophisticated than
anything the Roman authors had, though Vitruvius had noted some of these criteria as issues, e.g. humidity, temperature,
comfort, and wind speed.

3. SITE SELECTION

Cato (234-149 BCE) wrote, in De agricultura (1), that a good piece of farmland ‘should have a good climate, not subject to
storms … if possible it should lie at the foot of a mountain and face south; the situation should be healthful … it should be
well watered, and near it there should be … the sea, or a navigable stream …’. Vitruvius suggested farmhouses be located
following similar principles to those for cities (6.6.1), and so presumably the converse would apply. The emphasis was on
health.

Vitruvius introduced the siting of cities with respect to microclimate: ‘First, the choice of a very healthy site: this will be in a
high place, without mists or frost, and exposed to weather conditions that are neither sweltering nor freezing, but temperate’
(1.4.1). Palladius echoed this, for the siting of farms, recommending ‘a location well away from valley bottoms and innocent
of night mists’ (1.3).

For cities on the coast, Vitruvius wrote that, if they ‘face south or west, they will not be good for the health, because in the
summer the zones exposed to the southern sky heat up with the rising sun and burn hot at midday, while a site facing
west is warmed when the sun has risen, is hot at midday and swelters in the evening’ (1.4.1). This is quoted uncritically by
Olgyay, in Chapter VI Sol-air orientation, who overlooked the limited application to cities on the coast, noted that Vitruvius
‘was rightly concerned with both the quality and the regularity of sunshine’ (p. 53), and made no comment on the aversion
to a southern aspect, which contradicted his own recommendations (Tables 1 and 2).

Bearing in mind the effects of latitude, Vitruvius argued that houses in the cooler north should be roofed over (no open
courts), as closed as possible, with few apertures, and oriented towards the south (contradicting himself). On the other hand
houses in the warmer south should have more apertures and face north or north-east (6.1.2). Palladius echoed this, saying
that farmsteads in cold regions should be oriented to the east or south and, in hot regions, to the north (1.7.3). Palladius
noted that ‘if it [the farmstead] is cut off from these aspects by some large mountain standing in the way, it will be freezing,
with the sunshine excluded by a northern aspect, or postponed till evening by a westerly one’ (1.7.3). He suggested the
whole farm building should face south ‘receiving the early morning sun in winter on its corner, while it is somewhat turned
away from the setting sun in summer. The result will be that the building is lit by the sun through the winter, and unaffected
by its heat in summer’ (1.8.3). See Table 1.

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Facing</th>
<th>Zone</th>
<th>Cato</th>
<th>Vitruvius</th>
<th>Palladius</th>
<th>Cato</th>
<th>Vitruvius</th>
<th>Palladius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool</td>
<td>-</td>
<td>Lower hillside</td>
<td>High</td>
<td>Away from valley bottom</td>
<td>South</td>
<td>South</td>
<td>East or south</td>
<td></td>
</tr>
<tr>
<td>Temperate</td>
<td>Lower hillside</td>
<td>High</td>
<td>Away from valley bottom</td>
<td>South</td>
<td>South</td>
<td>South</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warm</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>North or north-east</td>
<td>North</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Olgyay mentioned microclimate in chapter V Site selection, and noted that ‘this effect is well known to farmers, who
prefer southern slopes for growing grapes or cultivating orchards’ (p. 44), harking back to the concerns and experiences of
Cato through to Palladius. Olgyay went on to discuss the effects of topography and natural and built-up surroundings, and
recommended criteria for site selection (Table 2). His criteria for cool and temperate climates are similar to the Roman’s, but
not for hot climates.
Table 2: Olgyay’s criteria for site selection.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Altitude</th>
<th>Facing</th>
<th>Wind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool</td>
<td>Half way up a slope</td>
<td>SSE</td>
<td>In wind shadow</td>
</tr>
<tr>
<td>Temperate</td>
<td>Lower portions of slope</td>
<td>Farther east of south (SE?)</td>
<td>Avoid winter winds, use summer breezes</td>
</tr>
<tr>
<td>Hot-arid</td>
<td>Lower hillside</td>
<td>ESE</td>
<td>Heat loss dominates</td>
</tr>
<tr>
<td>Hot-humid</td>
<td>Crest of a hill</td>
<td>South or north</td>
<td>Wind flow dominates</td>
</tr>
</tbody>
</table>

3.1 Marshes

In consideration of their impact on health, Vitruvius discussed marshes at length. Marshes were a common issue for the siting of settlements in the ancient world because ideal new cities were built on flat land (for ease of construction and utility), on the coast (for trade), and near rivers (for fresh water). In those circumstances marshes were commonplace, and Vitruvius gave a number of examples: Altinum, Ravenna and Aquileia (1.4.11), and Salapia in Apulia (1.4.12), all on the Adriatic.

According to Vitruvius: ‘Proximity [of the proposed city] to marshy terrain is to be avoided’ (1.4.1). Palladius agreed (11.7.4). Vitruvius considered that the problem was the mist emitted by marshes: ‘For when the morning breezes blow towards the town at sunrise, and these are joined by the mists that have sprung up, and the noxious breath of marsh animals mixes with the mist and wafts into the bodies of the inhabitants – all this makes the site unhealthy’ (1.4.1). Palladius particularly recommended avoiding a marsh ‘which faces south or west and dries out in summer, in view of the pestilence or noxious animals that it generates’ (1.7.4). The principal cause of poor health arising from nearby marshes was, of course, mosquito-borne malaria, thought by some to have contributed to the fall of Rome (Thompson, 2011). Palladius perhaps understood this, in his reference to ‘noxious animals’, whereas Vitruvius did not.

Vitruvius mentioned drainage as a solution for coastal marshes higher than the seashore: ‘For the marsh water can be released onto the shore by digging ditches’ (1.4.11). He wrote that the Pontine Marshes south of Rome, partly below sea level and separated from the sea by coastal dunes, were difficult to drain, and gave out ‘heavy and unhealthy vapours’ (1.4.12). Julius Caesar intended to drain them, and Augustus dug a canal there. But they were first reclaimed under the Fascist Party in the 1930s as part of the eradication of malaria in Italy. This drainage system was destroyed by the Germans in 1943, but the marshes were re-drained after the war (Snowden, 2005).

Land-locked marshes were sometimes drained in the ancient world. One example is the Petchai Lake on the island of Euboea, Greece, for which the contract is extant (336 -323 BCE) (Knoepfler, 2001). Another is the Fucine Lake in central Italy, drained under Claudius (55-66 CE), to control flooding and the health risk (O’Dwyer, 2018). The success of this project is uncertain. The lake was drained permanently in 1877.

Marshes were not mentioned by Olgyay, though they affect microclimate (McInnes, 2010).

4. SOLAR ORIENTATION

According to all three ancient authors – Vitruvius, Faventinus, and Palladius – the various parts of houses and farmhouses were to face in different directions, all to do with the sun (Table 3).

4.1 North-facing

Summer dining rooms should face north, wrote Vitruvius, because that orientation ‘is always cool and provides an environment that is healthy and pleasant to work in’ (6.4.2). Faventinus agreed, adding that ‘at the summer solstice it imparts to our bodies a pleasant sensation of good health’ (14). Palladius suggested that summer quarters ‘should face north and the sunrise at the solstice’ (1.9.5, 1.12). Vitruvius said, to ensure that colours do not fade, picture galleries, embroiderers’ workshops and painters’ studios should also face north (6.4.2). Faventinus (15) agreed, and explicitly mentioned the deterioration of purple dyes, which were very costly. He blamed the decay on heat rather than (UV) light. Faventinus also suggested that baths for summer use (presumably including cold baths) should face north or north-east: ‘This will give the bathers a healthier and pleasanter refreshment’ (16).

For the farmhouses of gentlemen-farmers, to the north was the wine cellar, ‘for if it faces in some other direction so that the sun could heat it up, the wine in such a cellar will be weak because it has been spoilt by the heat’ (6.6.2). And again, ‘nobody takes the light for covered wine-stores from the south or west, but from the north, because that orientation is never subject to changes in temperature, but is always stable and unchanging’ (1.4.2). Faventinus (13) agreed with the reasoning, and Palladius simply agreed with the orientation (1.18.1). This is in line with current recommendations for storing wine: in a dark cellar, with a temperature in the range of 12-16°C, a relative humidity of 75%, and as little diurnal and seasonal variation
in these parameters as possible (DanMurphy’s, 2018). Granaries, and stores for foodstuffs and fruit, likewise should face north (1.4.2) or to the north or north-east, ‘because this way the grain will not be able to heat up quickly, but, cooled by the air, will keep for a long time. In fact different orientations generate weevils and other small insects that habitually damage grain’ (6.6.4). Faventinus (13) agreed, giving similar reasons. Palladius agreed, but added that ‘it needs … to be fairly high, well away from all moisture … cold, windy and dry’ (1.19.1).

4.2 East-facing

For houses, bedrooms and libraries should face east because ‘their function requires morning light, and again, so that the books in the libraries will not rot. For in the case of libraries facing south and west, books are damaged by bookworm and the damp …’ (6.4.1). Faventinus (14) agreed that these rooms needed morning light. Spring and autumn dining rooms should also face east, ‘For the trajectory of the sun as it passes to the west opposite dining rooms exposed to the impact of its light makes their temperatures comfortable at the time when they are usually in use’ (6.4.2). Faventinus (14) and Palladius (1.12) agreed.

For farmhouses, facing the east were the cattle stalls, because ‘the coats of cattle facing light … do not become shaggy. Again, farmers, who are certainly [not] ignorant of the regions of the sky, do not think that cattle should face any other part of it except the east’ (6.6.1). He added that oxen ‘become more healthy looking’ if they eat their fodder in such stalls during winter mornings with clear skies (6.6.5). Faventinus disagreed, stating that stalls for oxen should be ‘in a southward-facing place … for they acquire a glossier complexion if they face the light’ (13).

4.3 South-west facing

For houses, winter dining rooms and bathrooms should face the south-west because ‘they need to receive the evening light; and also because the setting sun, shining splendidly in their direction and radiating heat, makes that orientation warmer in the evening’ (6.4.1). Faventinus had winter dining rooms facing the winter sunset (south-west), ‘for they need evening light. For the setting sun not only gives light but gives out a heat sufficiently strong to warm that part of the sky’ (14). Again, hot and warm baths in particular ‘should be lit from the south-west; but, if the character of the site prevents this, they should be lit from the south, because customarily the most popular time for bathing is from midday to evening’ (5.10.1). Faventinus (16) agreed. Palladius had the bath-house with ‘lights [i.e. windows] on the south side and facing west in winter, so it is cheered and brightened all day by the sunlight’ (1.39.1).

4.4 South-facing

Palladius stated that winter living quarters should face south, so ‘that they can be gladdened by virtually the whole course of the winter sun’ (1.9.1, 1.12). Vitruvius wrote that the kitchen should be located in the warmest part of the farmyard (6.6.1), and Faventinus (13) agreed with this.

Vitruvius wrote that for farmhouses, to the south was the oil cellar, ‘because oil must not be chilled but kept fluid by warm conditions’ (6.6.3), and Faventinus (13) and Palladius (1.20) agreed. Current recommendations for storing olive oil are the opposite: in a cool, dark storage space, in sealed containers such as fusti, decanting to small containers for daily use (Olive Oil Source, 2018). The stables should also be allocated to the warmest part of the farmhouse (but not near the kitchen fire) (6.6.4). Palladius advised that stables for horses and oxen should face south, but with a light source to the north and a fireplace close by (‘oxen will become sleeker’) (1.21). The condition of cattle was important!
Olgyay dealt with solar orientation in chapter VI *Sol-air orientation*. His suggested room orientations are shown in Table 4, for latitude 35° N (Rome is at 42° N). There are similarities with the Roman orientations. For example, in both cases workshops are to the north, bathrooms may face nearly any direction, and kitchens face a southerly direction. There are some differences. Roman farms used different dining rooms and bathrooms at different times of the year – Roman gentleman-farmers could afford it. Romans preferred east-facing bedrooms, whereas Olgyay had them facing from north to east to south-west.
The use of eaves for sun control on south-facing walls was not mentioned by the Roman authors, though they were familiar with shadow-casting for sundials. However, Palladius suggested that the farmyard should be open to the south and exposed to the sun, ‘since it will be quite easy to fashion lean-tos … to moderate summer’s heat for the animals in the yard’ (1.22). Olgyay discussed sunshading at length, in chapter VII Solar control.

5. WINDS

Aristotle thought that cities should be on east-facing slopes, because ‘breezes that blow from the sunrise are more healthy’, and that sites should face away from the north wind, so as to be milder in winter (Politics, 7:1330a). Vitruvius, on the other hand, regarded all winds as deleterious to health: ‘if the winds are cold they damage the health, if hot, they are infectious, and if humid, they are noxious’ (1.6.1). He argued for their complete exclusion: ‘Excluding the winds will not only make a place healthy for people who are well, but also … [diseases] will be cured more rapidly in these areas because of the moderate climate created by the exclusion of winds’ (1.6.3). Baths should face ‘away from the north and north-west winds’ (5.10.1). Faventinus noted, oddly, that ‘any [town house] apartments that face due south are spoilt by damp. This is because damp winds breathe moisture and corrupt anything with the pallor of decay’ (14).

Vitruvius accepted the teachings of ‘those who have looked into the matter’ that there were exactly eight winds, rather than four (1.6.4), or more than eight (1.6.9). Confusingly, Vitruvius added another 16 winds in the next paragraph, bringing the total up to 24 (1.6.10), but he did not use this number for setting out city grids. Faventinus listed both four and eight winds, echoing Vitruvius, but added that ‘most men assert that there are twelve winds’ (2). Vegetius agreed (4.38), for naval purposes, though his naming is sometimes at odds with both Aristotle (Meteorologica, 2.6) and Vitruvius.

Vitruvius described the construction of an eight-sided wind rose (1.6.6-7; 1.6.12-13). However, he did not recognise that different locations for cities might have different prevailing winds – the rose was not used to map the directions of the prevailing winds. Rather, he thought that the winds could come only from these eight directions and, for a given location, from any and all of them at various times. This was wrong-headed. Aristotle (350 BCE) was well aware of seasonal winds and their nature (Meteorologica, 2.6), and Vitruvius actually mentioned them in passing, along with morning breezes (1.6.11). But he ignored these ideas in his guidance for laying out cities.

This eight-wind logic suggested to Vitruvius that orienting the street grid in a city ‘between’ these eight directions, no matter where the city was located, could ensure that the inhabitants were not unduly exposed to the winds: ‘For these reasons, the rows of houses should be aligned away from the directions in which the winds blow, so that when they arrive, they buffet the corners of the blocks of houses and so are repelled and dissipate themselves’ (1.6.8). He produced two diagrams (schemata) to help the reader understand his proposals. One showed how, ‘by turning the alignments of the blocks of houses and avenues away from the winds’ onslaughts, their damaging blasts can be avoided’ (1.6.12). But, along with the other diagrams he prepared, these schemata have been lost.

Faventinus reduced all this to the idea that doors and windows should not face harmful winds (too strong or too cold): ‘So in cold districts you must place your doors and windows so that they face south or the direction of winter sunsets, while in hot districts you must contrive that they face north’ (2).

Wind was also an issue in the layout of military encampments. Table 5 shows the orientation (the direction in which the principia faced) of gridded Roman forts (Bishop, 2012), against Vitruvius’ idea that this should be ‘between’ the winds. It can be seen that most are actually oriented with the winds (±5°). There were, of course, other considerations, such as expected enemy location, but this does suggest that Vitruvius was ignored in practice. This is also contrary also to Olgyay’s claim that the axis of Roman military camps ‘consistently ranged not more than 30° from the meridian [N-S axis]’ (p. 54).
Table 5: Orientation of 64 Roman legionary fortresses.

<table>
<thead>
<tr>
<th>Orientation ±5°</th>
<th>±10°</th>
<th>&gt;10°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between the 8 winds</td>
<td>With the 8 winds</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>356; 0; 5</td>
<td>350; 6, 7, 8</td>
</tr>
<tr>
<td>22.5</td>
<td>21; 26</td>
<td>16; 28, 32; 12; 33</td>
</tr>
<tr>
<td>45</td>
<td>42, 43, 43.5; 45; 48, 50</td>
<td>35, 39, 52; 34</td>
</tr>
<tr>
<td>67.5</td>
<td>71</td>
<td>59, 62; 77; 78</td>
</tr>
<tr>
<td>90</td>
<td>88, 89; 90, 90; 93</td>
<td>100; 79; 101</td>
</tr>
<tr>
<td>112.5</td>
<td>113</td>
<td>104, 106; 119, 121; 123</td>
</tr>
<tr>
<td>135</td>
<td>130, 132; 140</td>
<td>124</td>
</tr>
<tr>
<td>157.5</td>
<td>156; 159, 161</td>
<td>150; 163</td>
</tr>
<tr>
<td>180</td>
<td>180; 185</td>
<td>172; 187, 188</td>
</tr>
<tr>
<td>202.5</td>
<td>204</td>
<td>196, 212</td>
</tr>
<tr>
<td>225</td>
<td>222, 223.5; 225; 226</td>
<td>219, 233, 235; 214</td>
</tr>
<tr>
<td>247.5</td>
<td>248</td>
<td>258</td>
</tr>
<tr>
<td>270</td>
<td>270, 270</td>
<td>262</td>
</tr>
<tr>
<td>292.5</td>
<td>315</td>
<td>286, 287; 283; 303</td>
</tr>
<tr>
<td>320</td>
<td>322, 324; 304</td>
<td></td>
</tr>
<tr>
<td>337.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Olgyay dealt with winds in chapter IX *Wind effects and air flow patterns*. He recognised the need for settlements to be laid out to minimise exposure in cool windswept places, the importance of breezes for cooling in hot climates, and the need for a careful wind analysis in most climatic zones. To this end Olgyay used 8-sided wind roses, like Vitruvius, but showing frequency and velocity. He suggested a combined wind and sun orientation score, but for this he assumed that all winter winds were undesirable and all summer winds were desirable. This was nearly as simplistic as Vitruvius. Though moderated by his use of winter and summer thermal coefficients, a more nuanced approach is preferred. For Adelaide for example, northerly winds might be considered bad in summer and good in winter, and southerly winds good in summer but bad in winter.

### 6. DAYLIGHTING

Vitruvius advised that: ‘As a rule, we must organize things so that from whichever sides the sky can be seen, spaces for windows should be left there so that buildings will be well lit’ (6.6.7). This was easier to achieve for farm buildings than for city buildings ‘because no neighbour’s wall can get in the way’ (6.6.6). For buildings in cities, ‘obstructions caused either by the heights of party walls or restrictions of site create darkness’ (6.6.6). Faventinus blended these ideas, stating that ‘the beauty of a property in town must owe a lot to its lighting, especially when there are no adjacent walls to interrupt this’ (14). Palladius merely said that ‘in rural construction we must ensure first and foremost that it is bright and well lit’ (1.12).

Vitruvius proposed a simple test for ensuring adequate daylighting in these circumstances:

‘on the side from which it is appropriate to take the light, a piece of string should be stretched to the top of the wall which seems to obstruct the light to the location where it would be convenient to admit it, and, if a wide area of the open sky can be seen when one looks up from the line [of the piece of string], the light there will not be obstructed. But if beams, lintels or wooden floors get in the way, the opening should be made higher up and the light admitted in this way’ (6.6.6-7).

This anticipated an idea behind the Waldram Diagram, now defunct (Walsh, 1961). He also anticipated the concern of the Australian National Construction Code (NCC) for safe movement: ‘While the necessity for illumination is at a maximum in dining rooms and other rooms, it is also essential in passages, ramps and stairs because people moving in opposite directions carrying loads often run into each other in such places’ (6.6.7). The NCC performance requirements, which prefer natural light for the purpose, apply to sanitary compartments, bathrooms, showers, airlocks, laundries and the like. It might be thought, with Vitruvius, that safe movement is more of an issue in passages, ramps and stairs.

Glazed windows were unknown to Vitruvius. Seneca (4 BCE-65 CE) wrote that glazed windows were ‘developed only within our own memory’ (Epistles 90.25). They were widely used in public baths, with gridded frames, as at the Baths of Faustina, Miletos (ca. 170 CE) (Taylor, 2003, p. 250). Glazed windows could, of course, admit more daylight (by doing away with shutters and screens) while excluding the winds of so much concern to Vitruvius – they changed architecture. Seneca
wrote that baths should be arranged to receive sunlight all day long through wide windows so gentlemen-farmers can bathe ‘and get a coat of tan at the same time’ and ‘look out from their bath-tubs over stretches of land and sea’ (Epistles 86.8).

Olgyay did not address daylighting – Vitruvius’ approach to design with climate was in some ways more holistic.

7. CONCLUSION

Faventinus and Palladius happily derived their material from Vitruvius, suggesting that his ideas on design for climate were considered valid for close to 500 years. Some were referenced approvingly by Olgyay, 1500 years later. The Romans, then, were right about many things. They understood the importance of latitude to the design of buildings. Vitruvius had a good understanding of shadow casting, but for sundials rather than for sunshading. The Roman authors understood the importance of altitude and orientation in siting cities and farms, but did not attempt Olgyay’s systematic overview across climatic regimes. Vitruvius was concerned about marshes being near to cities, due to malaria, not mentioned by Olgyay. Like Olgyay, the Romans understood the importance of room orientation with respect to the sun. They took account of winds blowing from eight nominal directions, which is a good enough approximation of reality for design purposes – Olgyay understood this whereas Vitruvius did not. They advocated daylighting, not mentioned by Olgyay, and Vitruvius was ahead of his time in terms of daylighting for safety.

However, the Romans were wrong about other things, particularly the mechanisms behind their observations, e.g. why marshes are unhealthy, why the sun moves in the sky as it does, the generation of breezes, and the effects of heat. Vitruvius had a simplistic view of winds, regarding all as undesirable, but this was not much improved by Olgyay.

Vitruvius’ concern with winds, though overdone, makes sense given that window glass was unknown at the time. Indeed, the approach of the Roman authors to design with climate, though rationalised in terms of the state of knowledge at the time, and emphasising health, was often eminently sensible, and certainly warranted citation by Olgyay, though his emphasis was on comfort.

References