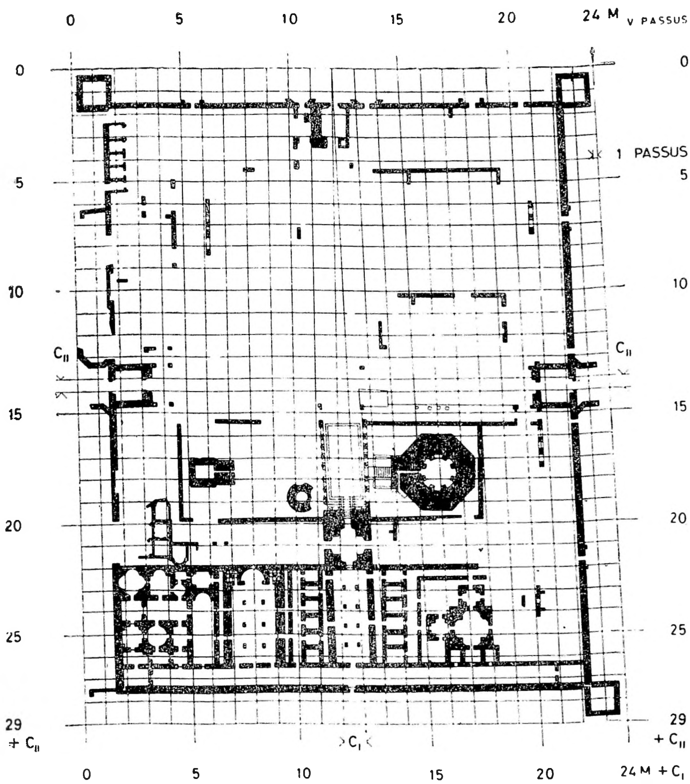
THE MODULAR COMPOSITION OF DIOCLETIAN PALACE IN SPLIT

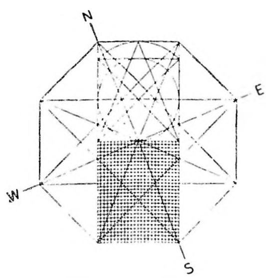
Palladio, the British architect R. Adam, the Austrian G. Niemann, the French E. Hébrard and J. Zeiller, have measured the Roman Palace of the emperor Diocletianus in modern Split (or Spalato) in various systems of measurement. Their drawings are equiped with sizes in piedi Vicentini, in English foot-inch system, and in modern metre. Besides, we have reason to believe that piede Veneziano, Wienerfuß, and perhaps some Turkish sizes were used for measurements of some details.

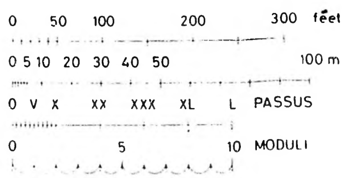
Sizes of the Palace, expressed in metre or various foot systems, are figured in complicated, often fractional numbers. But the same sizes, retranslated into the standard Roman system of measurement, result in simple integers. The Roman modular composition of the Palace, obscured by the complicated multiples of various recent units of length, becomes evident in whole multiples of original Roman sizes.

In his Lib. I., C. V. Vitruvius explains that foundations are wider than the walls above. Taking this compositional enlargement into account, the actual northern elevation of the Palace, which is 118 double Roman paces wide (1 passus = 1,479 m) is enlarged to 120 passus by adding 1 passus for the foundations on each side. Similarly, the somewhat wider southern side (123 passus) is enlarged to 125 passus. — The common denominator, or module (M), of sizes 120 and 125 passus, measures 5 passus. The modular width of the Palace on the northern side is 24 M and on the south 25 M. The irregularity — enlargement of the southern façade for 1 M is proportional correction.

The Palace has been situated on the shore, slightly sloping to the sea, which means that the southern elevation is higher than the northern one. To keep the same ratio, the higher elevation must be proportionally longer. Indeed, the lengthening of the southern elevation is done by intercalation of an additional module in the axis along the cardo. The interior arrangement of the Palace is subordinated to the traces of the intercalation which is evident in the twisted form of the peristylium and of the central hall of the Palace's substructure.







PROPORTIO Θ PARITUR EX OCTAGONO

1 MODULUS = V PASSUS
C_I = CORRECTIO PROPORTIONALIS
= 1 MODULUS = V PASSUS
C_{II} = CORRECTIO PROPORTIONALIS
= $\frac{1}{2}$ MODULI = V GRADUS

PELLI SERIES

$$1 - \Theta - \Theta^2 - \Theta^3 - \Theta^4 - \Theta^5 - \ldots$$

$$\begin{array}{l} 1 - 2 - 5 - 12 - 29 - 70 - \ldots \\ 2 - 4 - 10 - 24 - 58 - 140 - \ldots \end{array} \longrightarrow \lim \frac{\Theta}{2}$$

$$\frac{29}{24} \sim \text{XD (QUADRIAGON)} \sim \frac{\Theta}{2}$$

$$\frac{\Theta}{2} = \frac{\sqrt{2}+1}{2} \sim 1{,}207$$

TURRIUM MURORUMQUE FUNDAMENTA SIC SUNT FACIENDA, UTI FODIANTUR, SI QUEAT INVENIRI, AD SOLIDUM ET IN SOLIDO, QUANTUM EX AMPLITUDINE OPERIS PRO RATIONE VIDEATUR, CRASSITUDINE AMPLIORE QUAM PARIETUM, QUI SUPRA TERRAM SUNT FUTURI, ET EA IMPLEANTUR QUAM SOLIDISSIMA STRUCTURA

VITRUVII DE ARCHITECTURA LIB I C. V

The Palace's length becomes, with the addition of 1 passus to each side, 147,5 passus, or 29,5 M.

Southern parts of both longer elevations on the eastern and on the western side are closer to the sea and therefore higher than northern parts. To keep the same proportion both southern halves, which are higher, must be also proportionally longer. Indeed, both elevations are divided by the entrances in two unequal parts, and the enlarging 0,5 module of the proportional correction compounds with the entrance itself.

Without the proportional enlargement the length and width of the Palace, reduced to ideal rectangle, are 29 and 24 modules.

Numbers 29 and 24 are terms of the first and of the double first Pell series:

$$1 - 2 - 5 - 12 - 29 - 70 - \dots$$

$$2 - 4 - 10 - 24 - 58 - 140 - \dots$$

Ratios of the adjacent terms in Pell series tend to Θ which is an irrational value equal to $1 + \sqrt{2}$. The ratio of 29 : 24 is a rational approximation of $\Theta : 2 = \frac{1 + \sqrt{2}}{2}$.

The geometrical symbol of the proportion $1 : \Theta$, and of related proportions, $1 : 1$ (a square), $1 : \sqrt{2}$ (diagon), $1 : 2$ (double square), is the eight-pointed star forming octagram. The form of the octagram is frequent in the plan of the Palace. The Mausoleum (today the Cathedral of Split) and pairs of turrets flanking eastern, northern, and western, gates are octagonal. All other forms in the Palace, in plan or in elevation, are in ratios related to Θ. Plans of turrets on the four Palaee's corners e. g. are squares — $1 : 1$; plans of rooms and halls in the still existing substructure are either square — $1 : 1$, or double square — $1 : 2$, or diagon $1 : \sqrt{2}$, or quadriagon — $\Theta : 2$. The Palace itself is in the ratio 29 : 24, which approximates quadriagon.

The repetition of the same ratio (or of the related ratios) is essential for the idea of proportion.

When discussing the shape of a town, Vitruvius does not recommend rectangles at all. In only one sentence a circular (= polygonal?) form is suggested for a town by Vitruvius for defensive reasons. But the entire Chapter VI of Vitruvius' Book I on Architecture is devoted to the shaping of a town from the point of view of the eight winds with the conclusion that town's form must be octagonal.

The theory of winds as the determining factor in town design seems inflated. It gives impression that Vitruvius used so many words for it more to convince himself than his readers. It seems to be only a misunderstood principle of proportioning with the aid of octagram, as found in the composition of Diocletian Palace.

ILLUSTRATION

The plan of Diocletian Palace on the grid in the rhythm of the town planning module M (5 passus).

Without taking into account the proportional corrections, the ratio of modular multiples is 29 : 24, which approximates the proportion called quadriagon. The geometrical origin of quadriagon is octagram, or eight-pointed star. All forms in plan and elevations of the Palace (square, rectangles in ratio $1 : \sqrt{2}$, $1 : 2$, $1 : (1 + \sqrt{2})$, octagonal and cruciform shapes) and even the orientation of the Palace itself depend on octagram.

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