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1. EXPLANATION OF THE PROBLEM

The purpose of this paper is to present a study on numerical representation of astronomical calendric cycles in the main architectonical dimensions of the Sun Pyramid from Teotihuacan.

The analysis of this problem departs from the set of the following premisses:

1.1: there exists a certain dependence between architectonic style and a central ideological motivation in the development of various ethno-cultural systems;

1.2: the socio-cultural activities of the people in all the centers of ancient civilisations, with Prehispanic Mexico as the most extreme example, were ideologically regulated by astro-biological religions;

1.3: the very nucleus of these religions was everywhere the same and, it had been inrooted in the frame of the oldest megalithic cultures, somewhere in the Western of Near Eastern Mediterraneum, wherefrom came a stimulation towards constructing monumental architecture which served both; for cultic and astronomical purposes;

1.4: this architectonic inspiration, together with the linear measuring unit equal to 0.829 m (so called: "megalithic yard"), was brought to Mexico by, a more or less, sporadic transatlantic migration, in the time between III and II millennium B. C. which departed from a centre belonging to the Western wing of megalithic cultures.

Owing to all these premisses, it is probable that the Sun Pyramid as one of the most monumental and conspicous buildings of the sacral complex from Teotihuacan will reveal in its architectonic structure a reflection of the astronomical calendric cycles which played so important role in the astro-biological religion of the ancient Mesoamerica. *Precisely, this statement should be demonstrated in this paper.* However, before showing an attempt at such a demonstration, it seems reasonable to give some more explanations of the premisses listed above. They may run as follows.

Ad 1.1) The human programming of any cultural product needs suitable information and emotional motivation. Any monumental architecture which is built for a long-termed, public and ritualised use demands a huge and well organized social labour, as well as, its previous detailed programming. If so, its spatial structure and decoration *can not be* a product of a free, random play of determining factors but, both these constituents *must represent* the cultural information and motives stemming from the ideological subsystem (i.e. social, general model of the world with defined position of man within it) which organizes the *normotype* currently impregnating human mentality and regulating human behaviour within a given ethno-cultural system (see: Kossecki 1973 and 1975).

At once, worthy of mentioning is, for example, a very general correspondence between interiorised Christian religion and the construction of the churches closed completely from the above and all the sides in which the public ritual performances proceed and, the interrior of which is most richly decorated versus a correspondence between exteriorised ritualism of various ancient pre-Christian religions celebrated around and/or on the surface of the huge temple-pyramids with decorated façades, what was associated with vivication, personification and deification of many different objects and processes of the *external* environment. Such an opposition between the two extreme examples: a Gothic church and a temple-pyramid, may be consequently filled up with different *types of half-open temples* with a colonnade, richly decorated outside and inside.

On the other hand, all these sacral buildings, the programming of which and motivation descend from a religious ideology may be excellently contrasted with the public buildings of the modern architecture characterised by an abstractous simplicity of their external form and an economical functionality of the interior, devoided of any richer, symbolistic decorativeness.

And no wonder, since the mentality of the contemporary man of a "new deal" of Europo-American technocracy is, more and more, motivated by a narrow ideology of life's comfort and economy, included in a rationalistic, rather superficial scienticism.

Ad 1.2) The astrobiological model of the world which constituted the essential nucleus of ancient religions, in the frame of which appeared the structure of grave (or temple-pyramid), may be *most briefly* characterised in the following way;

2.1: the reality is permanently variable, vivified, personificated and deified, being subdued to periodical and cyclical transformations; the objects are only the time cross-sections of the processes—are their states in the time strata (the principle of the universal, psychological, processual variation);

2.2: at the base of this variation lies a dynamical unity of the pairs of interacting polarised opposites which manifest themselves as: male and female principles light and darkness, heat and cold, day and night, life and death, Heaven and Underworld, right and left, creation and destruction, Summer and Winter, Sun and Moon, top and base of the pyramid, etc. etc. (the principle of dually polarised Centre);

2.3: the polarised opposites generate a 4-fold field of forces distributed according to the cardinal points which constitutes a universal, organising frame of reference in all the things and processes; as the cosmic system of coordinates, it is denoted by the Polar Star, the Centre of the Earth and, by 4 cardinal directions; this 4-fold division may manifest itself as: 4 Elements, 4 parts of the day, 4 seasons of the year, 4 phases of the human life, 4 Cosmic Eras, 4 symbolic colours, 4 quarters of the town, 4 sides or 4 edges of the pyramid etc. etc.; together with the centre in the plane or, with the vertical axis in the space, it passes into 5-fold division (the principle of the field of 4(+1) cardinal points);

2.4: all the processes on the Earth are generated and regulated by the interplay of the rhythmical activities of the cosmic forces, the ordering of which is reflected in the movements of coelestial bodies on the firmament, first of all, those of the Sun, Moon and visible Planets, in reference to the distinguished star constellations and the points of the horizon (the principle of the creative and regulating role of the stable cosmic rhythms exerted on the biorhythms);

2.5: the world around man is divided into 3 main regions: upper or the Heavens, the living surface of the Earth and the lower i.e. the Underworld; in turn, these regions are further subdivided into more zones along the vertical axis of the cosmic system of coordinates; there is a connexion between the yearly round of the Sun and the divisions into 9 or 12 (+1 representing the Highest Centre) or 6 (again +1) heavenly zones; it was giving the possibility of calculating the covariation in the movements of coelestial bodies in the astronomical count of time (the principle of the division into World's Zones);

2.6: mutually interacting opposites create a universal, all vivifying and developing but also destructing energy of Fire, the portioning of which decides about the time order in the structure of the processes; this Fire may manifest itself in the light of heavenly bodies, the athmospheric lightnings, volcanic fire of the Earth, as well as, in the fire of house hearths, animal and human blood, in the human emotions or sacrificies; its transition into a Segmented Serpent of Time represents the time ordering of the states of a process (the principle of the unity of the universal energy of Fire and Time);

2.7: the development of the World in all its particular manifestations is previously informationally programmed in the highest (7th -th or 13th) zone of the Heaven; this programme is hierarchically ordered and idealised in the form of a Cosmic Calendar of Events; its realisation produces the world from a state of a maximum homogeneity (Primordial Waters of Chaos), causes its evolution and, in turn, its implosion (the principle of hierarchical descendance of the World's Programme);

2.8: in the cyclically conceived processes, the energy of the universal Fire *must be* preserved and suitably distributed; the human Fire-Soul which is a portion of the Cosmic Fire, can be timely imprisoned after the death in the Underworld or may pass into a given Heavenly Zone and, then, it descends back into the other body; from this results the idea of reincarnation and of effectiveness of bloody sacrificies or, the autodeprivation of emotions, as well as, the idea of the elementary cataclysms caused by the human sins (the principle of preservation of the energy of Universal Fire);

2.9: the human being living on this Earth most fully reflect the Macrocosmos; man is conceived as he would be a complicated lense which concentrates different cosmic forces and, so, his psychophysical construction is Imago Mundi (the piinciple of equivalency between Man as Microcosmos and, the Macrocosmos as an Anthropocosmos).

This shortly sketched above astrobiological world's model of ancient religions was being visualised in the iconic-numerical code of concentrically organised Mandalas (of which the richest example is the famous Aztec Stone Calendar!), as a Cosmic Tree or, more poorely, in the form of a grave or temple-pyramid as a Cosmic Mountain (see: Eliade 1966, Schwabe 1951, Tucci 1961, and Wierciński 1974).

It could be also dynamically represented in the system of complicated ritualisms of cyclical, public feasts, with very high emotional motivation derived from their dramatic theatralism, programmed in the order of the sacral calender which resulted from the astronomical compatibility of particular cosmorhythms.

Ad 1.3 and 1.4) The present author shares the general idea of D. J. Wölfel (1951) that the oldest megalithic cultures from the Iberian Peninsula or Near East have constituted a common, formative matrix for ideologies and monumental architecture of great centers of civilisation of the Ancient World.

Nowadays, this hypothesis can be further corroborated on the following grounds:

a) R. Müller (1970) and the whole discussion around the Stonehenge problem and also a larger review article of E. C. Baity (1973) have supplied new evidences for the presence of rather profound astronomical knowledge among "Megalithics", related to the count of time;

b) all the more elaborated megalithic structures which needed detailed programming and a good organisation of the public works implies clearly the rise of already well differentiated and rigidly organised theocratic elite;

c) a good number of these megalithic structures served both for cultic (at least sepulcral) practices and as astronomical instruments.

Thus, it is quite natural to expect an evolution of a system of feedbacks between the astronomical count of time which necessitated some mathematics and geometry and social stratification on one hand and, the development of agriculture with cattle breeding as a main subsistence economy and the rise of larger more densely populated settlements, on the other. From all these emerged the astrobiological vision of the world which reorganised previous more primitive religions, the monumental architecture and the beginnings of the urbanisation. The way from the oldest dolmen grave with a porthole and earthly mound to the grave or temple-pyramid has been opened!

However, how to connect the temple-pyramids from Prehispanic Mexico with megalithic cultures of the Mediterraneum? In order to answer this delicate question, first of all, worthy of emphasize are the papers of J. Alcina Franch (1969 and 1971) which attempted to show a series of possible archaeological links between neo-enolithic Europe and America. Secondly, the present author has published a series of anthropological studies dealing with intra — and interpopulational racial differentiation of both, ancient and modern Amerindian groups in Mexico (Wierciński 1969, 1971, 1972a and 1972b). They permitted to advance the working hypothesis that the Olmec civilisation, maternal for Mesoamerica, has been the product of an infusion of megalithic ideas, brought by a sporadic transatlantic migration from the Western Mediterranean centers of megalithic cultures, into the native, creative and archaic Amerindian background, intermingled with transpacific impulses from China of a transition between Shang and Dshou Periods. The last, more detailed discussion with the critics published by J. Comas (1972 and 1973) did not discredit but even strengthened the anthropological findings of the present writer (Wierciński 1974), at least, as regards the presence of Negroid components among the Olmecoid groups. Also, Z. Krzak (1972) has shown the navigation's possibilities existing in the frame of megalithic cultures of the Mediterraneum.

Consequently, the present writer has assumed that if a megalithic inspiration was brought to Mexico from the Western wing of megalithic cultures, between III and II millennium B. C., it might be reasonably expected that, at least, in some of the Mexican centers of the ancient monumental architecture, the megalithic measuring unit was used (i.e. megalithic yard = 0.829 m), as discovered by A. Thom (1962) and still more demonstrated by R. Müller (1970).

And indeed, a first preliminary analysis of the dimensions of the horizontal edges of the six bodies of Sun Pyramid from Teotihuacan, based on the data published by Harleston (1974) and converted into megalithic yards, revealed striking numerical coincidencies with the duration of several astronomical cycles, especially, with the sacral calendar of 260 days (Wierciński 1974—75).

This finding encouraged further analysis of the Sun Pyramid which will be presented below.

2. DIMENSIONS OF THE SUN PYRAMID AND THEIR ANALYSIS

As it was mentioned above, the main body of dimensions of the Sun Pyramid, as well as, those of the other buildings of the sacral complex from Teotihuacan has been recently published by H. Harleston (1974). He advantaged in his study the photogrametric data, field measurements and archaeological plans deposited in I. N. A. H., in the light of R. Millon's reconstruction (1970).

Of course, Harleston's data are burdened by some, though, probably not very great errors of his geometrical reconstruction (what is a great merit of this author), guided by his belief in a common minimum linear unit which brings all the dimensions of Teotihuacan objects into the integral numbers. He has found it equal to 1.059463 m and called it: "Hunab". Strangely enough, it is exactly 1/12 milionth of Earth's polar diameter. Thus, Harleston assumed that the theocratic elite who programmed the construction of Teotihuacan knew this diameter.

However, there is a complete lack of any scrap of evidence that the Teotihuacan priests knew anything about Earth's polar diameter and, the finding of a common divisor of Teotihuacan dimensions may also denote only that its architecture was built according to some simple proportionalities.

In any case, Harleston's data seem to approximate well the real, possible dimensions of the Sun Pyramid up to the error of 0.25% perm. and, converted into meters again may serve as the departure material for the purpose of this analysis.

The table I yields this departure material of dimensions of the Sun Pyramid together with the lengths of diagonals calculated for the squares formed by the edges of particular bodies of the Pyramid, in order to show their coincidencies with the calendric cycles. In turn, the table II represents the duration of possible calendric cycles, the data of which will appear useful in our analysis.

However, in order to study now more thoroughly the architecture of the Pyramid also the heights of its bodies must be considered. Their respective values are presented in the table III.

It may be immediately seen that the length of the edge of the highest 6th body equal to 23 m.y. is repeated again as the height of the lowest, 1st body. Moreover, the upper edge of the 1st body measures exactly 10×23 m.y.

Secondly, the elevation of the 6th body is almost exactly 1/6 of 23 m.y. and, it corresponds accurately to the time cycle of 13 (sic!) lunar months divided by 100 ($13 \times 29.5 = 383.5$ days).

If we connect these findings with the simple proportionalities found by Harleston and, the observation that the length of the upper edge of the 4th body near to about 82.8 m.y. times π gives roundly the number 260, it seems reasonable to suspect a very clever geometry which probably programmed the spatial structure of our Pyramid in relation to particular calendric cycles.

Since, the measuring error should be the lowest for the small objects and, at any rate, we deal with the Pyramid, let us start from its Top!

Thus, we may assume that the vertical elevation of the highest 6th body, so nicely corresponding to the round of 13 synodical months (surely well

Table I. The horizontal dimensions of the Sun Pyramid in meters and megalithic yards

Description of dimensions (north to south)	d_{ij} in meters (according to H. Harleston, 1974)	d_{ij} in megalithic yards (1 m.y. = 0.829 m)	$\sqrt{2d_{ij}^2}$ diagonal in m.y.	Sum of both diagonals (rounded)	Rough correspondance to calendric cycles
First body, lower edge (d_{11})	228.844	276.05	390.38	781	Mars
First body, upper edge (d_{12})	190.703	230.04	325.33	650.5	$2^1/_2 \times$ Tonalpohualli
Second body, lower edge (d_{21})	171.633	207.04	292.80	585.5	Venus
Second body, upper edge (d_{22})	135.611	163.58	231.34	462.5	$4 \times$ Mercure
Third body, lower edge (d_{31})	114.422	138.02	195.19	390	$1/2 \times$ Mars
Third body, upper edge (d_{32})	85.817	103.52	146.40	292.5	$1/2 \times$ Venus
Fourth body, lower edge (d_{41})	76.281	92.02	130.14	260	Tonalpohualli
Fourth body, central edge (d_{42})	74.798	90.23	127.60	255	?
Fourth body, upper edge (d_{43})	68.441	82.56	116.76	233.5	$2 \times$ Mercure
Fifth body, lower edge (d_{51})	57.211	69.01	97.59	195	$1/4 \times$ Mars
Fifth body, upper edge (d_{52})	38.141	46.01	65.07	130	$1/2 \times$ Tonalpohualli
Sixth body, lower edge (d_{61})	25.427	30.67	43.37	86.5	$1/3 \times$ Tonalpohualli
Sixth body, upper edge (d_{62})	19.070	23.00	32.53	65	$1/4 \times$ Tonalpohualli

Table II. A list of some calendric cycles (in days)

Synodical mouth	29 1/2
Mercure cycle	116
Tonalpohualli (sacral calendar)	260
Solar year without additional Nemonteni days	360
Common Solar year	365
13 months "Lunar year"	383 1/2
Saturn cycle	376
Jupiter cycle	399
Venus cycle	584
Mars cycle	780

Table III. The vertical dimensions of the Sun Pyramid in meters and megalithic yards

Description of dimensions	h_i in meters (according to H. Harlestone, 1974)	h_i in megalithic yards
First body, vertical elevation h_1	19.070	23.004
Second body, vertical elevation h_2	15.892	19.170
Third body, vertical elevation h_3	12.714	15.337
Fourth body, vertical elevation (lower) $h_{4(1)}$	2.119	2.556
Fourth body, vertical elevation (upper) $h_{4(2)}$	4.238	5.112
Fifth body, vertical elevation h_5	9.535	11.502
Sixth body, vertical elevation h_6	3.178	3.834

known in Mesoamerica), will be one of the key-lengths for the remaining dimensions of the Pyramid.

Having some degrees of freedom in the measuring error for particular dimensions and accepting the principle of possibly simple proportions, there were calculated little refined new values of bodies' heights as multiplicities of 3.835 m.y. (see: table IV). The deviations of the new heights in reference to primary Harleston's data appeared to be almost none. The greatest height h_1', previously equal to 23.004 m.y. now became 23.010 m.y. what is only 5 mm of the difference! The same regards to all the other heights h_i'.

Strikingly enough, number 23.010 is divisible without any rest by 2.60 (23.010:2.60 = 8.850).

Also, it is worthy of a great emphasize that $23.010 = 2.950 \times 7.80$ and that: $3.600 \times 23.010 = 82.836 \cong 260/\pi \cong d_{43}$ (look for astronomical coincidencies at the table II!).

Consequently:

$$23.010 = 6 \times 3.835 = \frac{82.836}{3.600} \cong \frac{260}{\pi \times 3.6}$$

Table IV. The vertical dimensions of the Sun Pyramid derived from 3.835 m.y.

Description of dimensions	Primary heights h_i in megalithic yards	Refined heights h_i' in megalithic yards	Difference in meters $(h_i - h_i')$
First body, vertical elevation h_1	23.004	23.010	0.005
Second body, vertical elevation h_2	19.170	19.175	0.004
Third body, vertical elevation h_3	15.337	15.340	0.003
Fourth body, vertical elevation (lower) $h_{4(1)}$	2.556	2.550	0.005
Fourth body, vertical elevation (upper) $h_{4(2)}$	5.112	5.120	0.006
Fifth body, vertical elevation h_5	11.502	11.505	0.003
Sixth body, vertical elevation h_6	3.834	3.835	0.001

Furthermore:

$$23.010 \cong \frac{5.84 \times 116}{29.5} \cong \frac{2.60 \times 260}{29.5} \cong \frac{116 \times 116}{584} \cong \frac{52 \times 260}{584}.$$

Having at disposal the numbers: 3.835, 23.010 and 82.836 m.y., so pregnant with concordances with calendric cycles, it would be difficult not to fall to temptation to see their relations with particular h_i'.

Table V. The refined vertical dimensions of the Sun Pyramid related to 828.36, 23.01, 3.835 and 2.60

Description of dimensions	Refined heights h_i' in megalithic yards	$\frac{828.36}{h_i'}$	$\frac{23.01}{h_i'}$	$\frac{h_i'}{3.835}$	$\frac{h_i'}{2.60}$
First body, vertical elevation h_1	23.010	36	1	6	8.850
Second body, vertical elevation h_2	19.175	43.20	1.20	5	7.375
Third body, vertical elevation h_3	15.340	54	1.50	4	5.900
Fourth body, vertical elevation (lower) $h_{4(1)}$	2.550	324	9	0.67	0.981*
Fourth body, vertical elevation (upper) $h_{4(2)}$	5.120	162	4.50	1.33	1.969
Fifth body, vertical elevation h_5	11.505	72	2	3	4.425
Sixth body, vertical elevation h_6	3.835	216	6	1	1.475

* This is only one height which is not divisible by 2.60 without a rest.

The table V represents in full extent this question. At the same time, it shows that all the heights h_i', generated by 3.835 m.y. are divisible without any rest by 2.60, corresponding to Tonalpohualli sacral calender of 260 days, with the exception of $h_{4(1)}'$.

But, $h'_{4(1)}$ is simply 1/9 of 23.010 m.y. and:

$$h'_{4(1)} + h'_{4(2)} = 7.67 = 2 \times 3.835 .$$

Can we approach a calendric meaning of the proportions:

$$\frac{h'_{4(1)} = 2.55}{3.835} = 0.6666 \ldots \quad \text{and:} \quad \frac{h'_{4(2)} = 5.12}{3.835} = 1.3333 \ldots ?$$

A possible reply is the following one:

$$\frac{520}{780} = 0.666 \ldots \quad \text{and:} \quad \frac{780}{584} = 1.336!$$

At present, after so promising results with the heights of particular platforms, let us see whether it will be possible to derive from them the values of all the horizontal dimensions (d'_{ij}) of the edges, if we shall accept the conditions that they should be nearest to primary d_{ij} and simply proportional to 82.836, 23.010, 3.835 and 2.60.

Thus, it should be noticed that:

$$\sum_{1}^{i} h'_i = 21 \times 3.835 = 80.535 = 82.836 - 2.301 \cong d_{43}$$

Then, consequently:

$$\begin{aligned}
82.836 + 4 \times 2.301 &= 92.04 \cong d_{41} \\
92.04 + 5 \times 2.301 &= 103.54 \cong d_{32} \\
103.54 + 15 \times 2.301 &= 138.06 \cong d_{31} \\
138.06 + 12 \times 2.301 &= 165.67 \cong d_{22} \\
165.67 + 18 \times 2.301 &= 207.09 \cong d_{21} \\
207.09 + 10 \times 2.301 &= 230.10 \cong d_{12}
\end{aligned}$$

(notice here that: $230.10 = 100 \times 2.301$ and: $230.10 + 13 \times 2.301 = 260$!!!),

$$230.10 + 20 \times 2.301 = 276.12 \cong d_{11} .$$

And:

$$\begin{aligned}
82.836 - 6 \times 2.301 &= 69.03 \cong d_{51} \\
69.03 - 10 \times 2.301 &= 46.02 \cong d_{52} \\
46.02 - 6.667 \times 2.301 &= 30.68 \cong d_{61} \\
82.836 - 26.0(!) \times 2.301 &= 23.01 \cong d_{62}
\end{aligned}$$

There remains only $d_{42} = 90.23$ m.y. which can not be so simply approximated.

Assuming that it must obey our rule of being totally divisible by 2.60, the nearest solution will be:

$$d'_{42} = 34.800 \times 2.60 = 90.48 \cong d_{42}$$

Ultimately, all the accepted dimensions of the edges of particular platforms, together with calculated diagonals and relations to π, 828.36, 23.01, 3.835 and 2.60, represents table VI.

There were also calculated the relations of the circumferences of squares $4d'_{ii}$ to 13 day "weeks" of Tonalpohualli. In connexion with this, it is worthy of notice that the remaining rests of the latter ones after dividing $4d'_{ij}/13$ correspond exactly to integral products of the divisions: $d'_{ij}/23.01$ or, if they are not integral, they approach 1/2 or 1/4 of 23.

Of course, the very slight deviations from the primary Harleston's data (with one only strange exception of d'_{22}) have caused the fact that all the previously observed coincidences (Wierciński, 1974—75) between sums of diagonals and the known calendric cycles persisted without any essential change, i.e. those of Mars ($= 781-1$), Venus ($= 585-1$), Tonalpohualli ($= 260$), Mercure ($= 4-117(-1)$ or $2\times 117(-1)$) and the simple divisions of Tonalpohualli.

In this way, the total architectonic structure of the Sun Pyramid from Teotihuacan could be expressed as the simple derivation from 260, 360 and 383.5, i.e. the Tonalpohualli, Solar and Lunar cycles.

It is easy to see that such simple and concordant results will not be obtained with any other of the calendric cycles, listed in the table II.

Moreover, some further calendric coincidences with the dimensions of the Sun Pyramid (when expressed in megalithic yards) should be stressed:

$d'_{11} = 4d'_{51} = 276.12$ m.y. $\Rightarrow 276$ days, the time span between Spring and Autumn Equinox,

$4d'_{52} = 184.08$ m.y. $\Rightarrow 183$ and half days between Summer to Winter Solstice,

$4d'_{61} = 122.72$ m.y. $\Rightarrow 383.5-260$ days,

$4d'_{62} = 92.04$ m.y. $\Rightarrow 92$ days between Spring Equinox and Summer Solstice,

$4d'_{41}+4d'_{42} = 368.16$ m.y. $+ 361.92$ m.y. $= 730.08$ m.y. $\Rightarrow 2\times 365$ days of full complete cycles,

$d'_{42} = 90.48$ m.y. $\Rightarrow \frac{116\times 780}{1000}$, a correspondance with Mars and Mercure cycle.

One may wonder that the different and more complicated shape of the 4th platform with 3 edges is the richest in direct coincidencies with calendric cycles, i.e.: with Tonalpohualli (all edges, diagonals of $4d'_{41}$ and, by π with d'_{43}), Mercure (diagonals of $4d'_{43}$), Mercure and Mars (d'_{42}), Lunar (d'_{41}) and Solar ($4d'_{41}$ and $4d'_{42}$).

Also, shall we be too far reaching, if we would emphasize that $\pi \cong \frac{13\times 29.5\times 29.5 \text{ (Moon)}}{360\times 10 \text{ (Sun)}} = 3.142$, what could correspond to a numeri-

Table VI. Full analysis of the horizontal dimensions of the Sun Pyramid

Description of dimensions (north to south)	Primary d_{ij} in megalithic yards	Refined d'_{ij} in megalithic yards	$\pi\times d'_{ij}$	$\frac{828.36^*}{d'_{ij}}$	$\frac{d'_{ij}}{23.01}$	$\frac{d'_{ij}}{3.835}$	$\frac{d'_{ij}}{2.60}$	Diagonal $\sqrt{2\times d'^2_{ij}}$	Rounded sum of both diagonals	Squares $4\times d'_{ij}$	Circumferences of squares divided by Tonalpohualli „weeks" $\frac{4d'_{ij}}{13}$	Difference in meters $d_{ij}-d_{ij}$
First body, lower edge (d_{11})	276.05	276.12	867.0	3	12	72	106.200	390.49	781	1104.48	84+12	0.068
First body, upper edge (d_{12})	230.04	230.10	722.5	3.600	10	60	88.500	325.41	651	920.40	70+10	0.050
Second body, lower edge (d_{21})	207.04	207.09	650.3	4	9	54	79.650	292.87	585	828.36	63+9	0.045
Second body, upper edge (d_{22})	163.58	165.67	520.2	5	7.200	43.20	63.720	234.38	468	662.68	50+12.5	1.729**
Third body, lower edge (d_{31})	138.02	138.06	433.5	6	6	36	53.100	195.25	390.5	552.24	42+6	0.029
Third body, upper edge (d_{32})	103.52	103.54	325.1	8	4.500	27	38.825	146.43	292.5	414.16	30+23	0.018
Fourth body, lower edge (d_{41})	92.02	92.04	289.0	9	4	24	35.400	130.17	260	368.16	28+4	0.020
Fourth body, central edge (d_{42})	90.23	90.48	284.1	9.155	3.932	23.59	34.800	127.95	256	361.92	27+11.5	0.210
Fourth body, upper edge (d_{43})	82.56	82.83	260.1	10	3.600	21.60	31.860	117.15	234	331.34	25+6	0.225
Fifth body, lower edge (d_{51})	69.01	69.03	216.7	12	3	18	26.550	97.63	195	276.12	21+3	0.015
Fifth body, upper edge (d_{52})	46.01	46.02	144.5	18	2	12	17.700	65.08	130	184.08	14+2	0.009
Sixth body, lower edge(d_{61})	30.67	30.68	96.3	27	1.333	8	11.800	43.39	86.8	122.72	9+5.7	0.007
Sixth body, upper edge (d_{62})	23.00	23.01	72.2	36	1	6	8.850	32.54	65	92.04	7+1	0.005

* Worthy of notice is that: $\frac{828.36}{d'_{ij}} = \frac{2600}{\pi\times d'_{ij}}$.

** This is only one bigger deviation from Harleston's departure data.

cal and geometrical expression of the "Mystical Marriage between Sun and Moon", so important in the ancient religions?

However, in Prehispanic Mexico the π value could be approximated also very closely by the equation:

$$\pi \cong \frac{260}{7.80 \times 2.95 \times 3.60} = 3.139$$

Moreover, the strict correspondance between the number of 13 edges which limit, in fact, 7 bodies (if a temple suggested on the top will be accounted) of the Sun Pyramid and the division into 13 and 7 Heavenly Zones ought to be noticed. Now, we need only an archaeological discovery of a richly endowed tomb at a base or near to it...

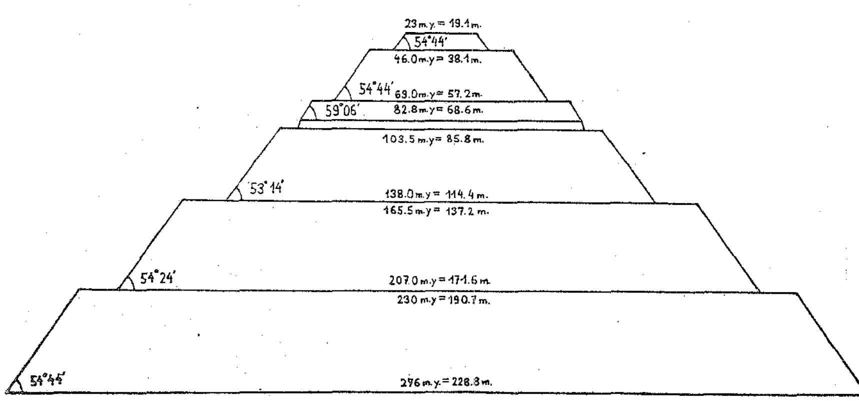

Fig. 1. The idealized architectonic structure of the Sun Pyramid from Teotihuacan

In order to make more complete this moderate analysis, the lengths of the side-edges together with respective angles have been calculated on the basis of h_i' and d_{ij}', what represents table VII and fig. 1.

Table VII. The remaining rest of the measurements of the Sun Pyramid calculated on the basis of d_{ij}' and h_i'

Description of the measurement	Side edge of the body's wall (in m.y.)	Height of the body's wall (in m.y.)	Angle of inclination of the wall	Angle of inclination of the side edge
First body	39.854	32.541	45°	54°44′
Second body	34.730	28.242	42°46′	54°24′
Third body	28.830	23.092	37°11′	53°14′
Fourth body, lower part	2.779	2.667	72°57′	73°41′
Fourth body, upper part	7.444	6.388	53°16′	59°6′
Fifth body	19.928	16.271	45°	54°44′
Sixth body	6.643	5.424	45°	54°44′

At the end, it should be stated that the whole picture of our time-numerical reconstruction of the Sun Pyramid will remain almost intact, if more rounded values for its dimensions would be accepted.

3. CONCLUSIONS

The present author is fully aware that the results of this analysis represent merely a working hypothesis since they are based on Harleston's data of only approximative value in reference to equally conjectural reconstruction of R. Millon. However, the heights of elevations of particular bodies of the Sun Pyramid should be the nearest to real dimensions and precisely out of them started our study.

The discovery of so many and specific for Mesoamerica numerical compatibilities between time and space in the architectonic structure of the Sun Pyramid was possible only thanks to the convertion of its dimensions into megalithic yards. This result is nothing strange, if the idea of the Cosmic Mountain will be applied in the interpretation. Perhaps, the other similar pyramid structures in Prehispanic Mexico might be explained in the same way. In connexion with this statement, for example, a legendary 9 stepped pyramid of king Nezaualcoyotl from Texcoco or the famous "Castillo" from Chichen Itza with 365 stairs may be quoted. If the Sun Pyramid from Teotihuacan will be interpreted as the Cosmic Mountain which codes the main assumptions of an astrobiological religion, the following conclusions should be inferred:

3.1: Top and base of the Pyramid, as well as, its surface and interior may reflect the idea of polarisation into pairs of oppositions (see: 2.2);

3.2: its stepped surface seems to correspond to hierarchic descendance of the World's Programme being, at the same time, a kind of a "frozen" Firmament while, its central or lower interior belongs to the Underworld (see: 2.4 and 2.5);

3.3: four sides and four side-edges correspond to the 4-fold division of the field of the cardinal points (see: 2.3); in this respect, the Sun Pyramid, together with the pyramid from Tenayuca, as well as the complex of Tula and Chichen Itza belong to the 17° system of F. Tichy (Tichy 1974);

3.4: the number of platforms or bodies of the Pyramid, together with a temple on the top, as well as, their horizontal edges, correspond to the division into 7 and 13 Heavenly Zones (see: 2.5);

3.5: the main dimensions of the edges and elevations of the Pyramid reflect numerically the principle of creative and regulating role of the cosmo-rhythms exerted on the Earth and Her Biosphere and as such, they are strictly compatible with the calendric cycles, first of all, with solar round of 360 days, lunar cycle of 13×29.5 days and, especially, with the sacral calendar of 260 days, so specific for the ancient Mesoamerica (see: 2.4).

This hypothetical interpretation of the symbolical meaning of the Sun Pyramid may be, more or less, easily verified by the similar analysis of the dimensions of analogical architectonic creations both, in Prehispanic Mesoamerica and in the Old Wordl, provided that they can be expressed in the native length-units of measure.

The present author expects that these other pyramids will also show exact, numerical correspondance of their dimensions to the used calendric cycles, especially, to the solar of 360 days and, at least, some lunar cycle.

In Egypt, a representation of the Syrius cycle may be suspected. A conviction that the solar cycle of 360 days could play such a great role in organizing the main dimensions of the ancient grave or temple-pyramids as the representations of the Cosmic Mountain, is based on the striking finding that *equally* in Mesoamerica, as well as, in ancient Egypt, Athens or Iran, there existed the idea of 5 "evil" or "unnecessary" days, additional to "regular" 360 round.

In ancient Mesopotamia the Star Day was divided into 360 parts. In connexion with the idea of the Cosmic Mountain and this area, so rich in the ziggurats-pyramids of 1, 3, 4, 5 and 7 platforms, the sacred names of these structures are of a special interest. They run, for example, as follows: "House of the Foundation of the Heaven and Earth" (Babylon), "Houghty House of Zababa and Innina the Head of Which Is So High As Heaven" (Kish), "House of the Seven Guides of Heaven and Earth" (Birs Nimrud), "House of Chins Between Heaven and Earth" (Larsa), "House of the Mountain" (Nippur) or, exactly, "House of the Mountain of the Universe" in Assur (see: Parrot 1968). Of course, it would be rather unwise to see in the Sun Pyramid a faithfull copy of the Sumerian or Babylonian ziggurat or that of the 6-platformed pyramid from Sakkara. We want to suggest here only a common formative, megalithic soure of inspiration which maturated notionally and architectonically in the form of a variety of the Pyramids-Cosmic Mountains.

At the very end of this paper, the present author has fallen to temptation of showing that:

a) a lengthy natural man's step is around 0.829 m;

b) the duration of the normal gestation's period corresponds to 9-10 $\times 29.5$ lunar months (251-299 days) being near 260 or 292 days which is exactly 1/2 cycle of Venus.

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REFERENCES

BAITY, E. C.

1973 *Archaeoastronomy and ethnoastronomy so far*, "Current Anthropology", vol. 14, p. 389

COMAS, J.

1972 *Hipotesis transatlanticos sobre el poblamiento de America. Caucasoides y Negroides*, Instituto de Investigaciones Historicas, UNAM, Mexico

1973 *Transatlantic hypothesis on the peopling of America. Caucasoids and Negroids*, "Journal of Human Evolution", vol. 2, p. 75

ELIADE, M.

1966 *Traktat o historii religii*, Książka i Wiedza, Warszawa

FRANCH, Alcina J.

1969 *Origen transatlantico de la cultura indigena de America*, "Revista Española de Antropologia Americana", vol. 4, p. 9

1971 *El "Formativo" Americano a la luz de los posibles influjos recibidos por el Atlantico*, "Anuario de Estudios Atlanticos", No. 17, p. 103, Madrid—Las Palmas

HARLESTON, H. Jr.

1974 *A mathematical analysis of Teotihuacan*, XLI Intern. Congress of Americanists (reprint), Mexico, D. F.

KOSSECKI, J.

1973 *Cybernetyka społeczna*, Centralny Ośrodek Metodyczny Studiów Nauk Politycznych, Warszawa

1975 *Cybernetyka kultury*, PIW, Warszawa

KRZAK, Z.

1972 *The problem of reconstructing an Afro-Iberian ship from the neolithic age*, "Almogaren", vol. 3, p. 147, Graz

MILLON, R.

1970 *Completion of Map of Giant Ancient City in the Valley of Mexico*, "Science", vol. 170 p. 10077

MÜLLER, R.

1970 *Der Himmel über dem Menschen der Steinzeit*, J. Springer, Heidelberg

NORRIEGA, R.

1974 *Interpretación matematico-astronomica de la Piedra del Sol*, XLI Congreso de Americanistas (reprint), Mexico D. F.

PARROT, A.

1968 *Biblia i starożytny świat*, Pax, Warszawa

SCHWABE, J.

1951 *Archetyp und Tierkreis*, B. Schwabe, Basel

THOM, A.

1962 *The megalithic unit of length*, "Journal Royal Statistical Society", vol. 125, p. 243

TICHY, F.

1974 *Deutung von Orts- und Flurnetzen im Hochland von Mexico als kultreligiöse Reliktformen altindianischer Besiedlung*, "Erdkunde", vol. 28, p. 194, Bonn

TUCCI, G.

1961 *The theory and practice of the Mandala*, Rieder Comp., London

WIERCIŃSKI, A.

1969 *Ricerca antropologica sugli Olmechi*, "Terra Ameriga", vol. 18-19, p. 17, Genova

1971 *Afinidades raciales de algunas poblaciones antiquas de Mexico*, "Anales de I. N. A. H.", vol. 2, p. 124, Mexico D. F.

1972 *An anthropological study on the origin of "Olmecs"*, "Światowit", vol. 33, p. 143, Warszawa

1972a *Inter- and intrapopulational racial differentiation of Tlatilco, Gerro de las Mesas, Teotihuacan, Monte Alban and Yucatan Maya*, "Światowit", vol. 33, p. 175, Warszawa

1972b *Interpopulational differentiation of the living Amerindian tribes in Mexico*, XXXIX Intern. Congress of Americanist, vol. 1, p. 213, Lima
1974 *Some problems in taxonomy of past and living populations of Amerindians*, XLI Intern. Congress of Americanists, Proceedings (in press), Mexico D. F.
1974—75 *Megalithic yard in Teotihuacan*?, "Almogaren", vol. 5, 5—6, Graz
WÖLFEL, D. J.
1951 *Die Religionen des vorindogermanischen Europa*, (in:) *Christus und die Religionen der Erde*, vol. 1, Kölln—Graz