THE PERIODIC TABLE OF THE POLYHEDRAL UNIVERSE

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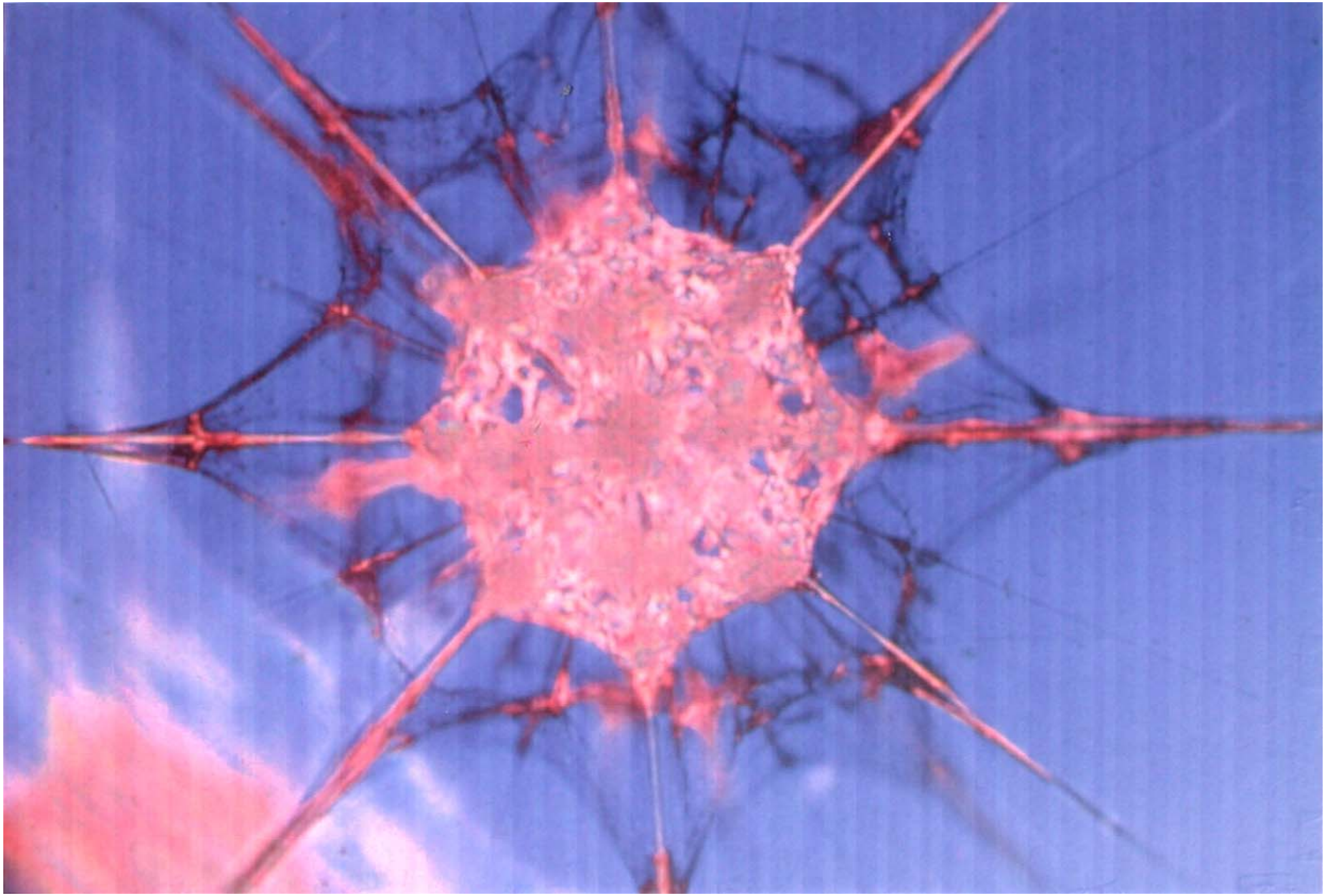
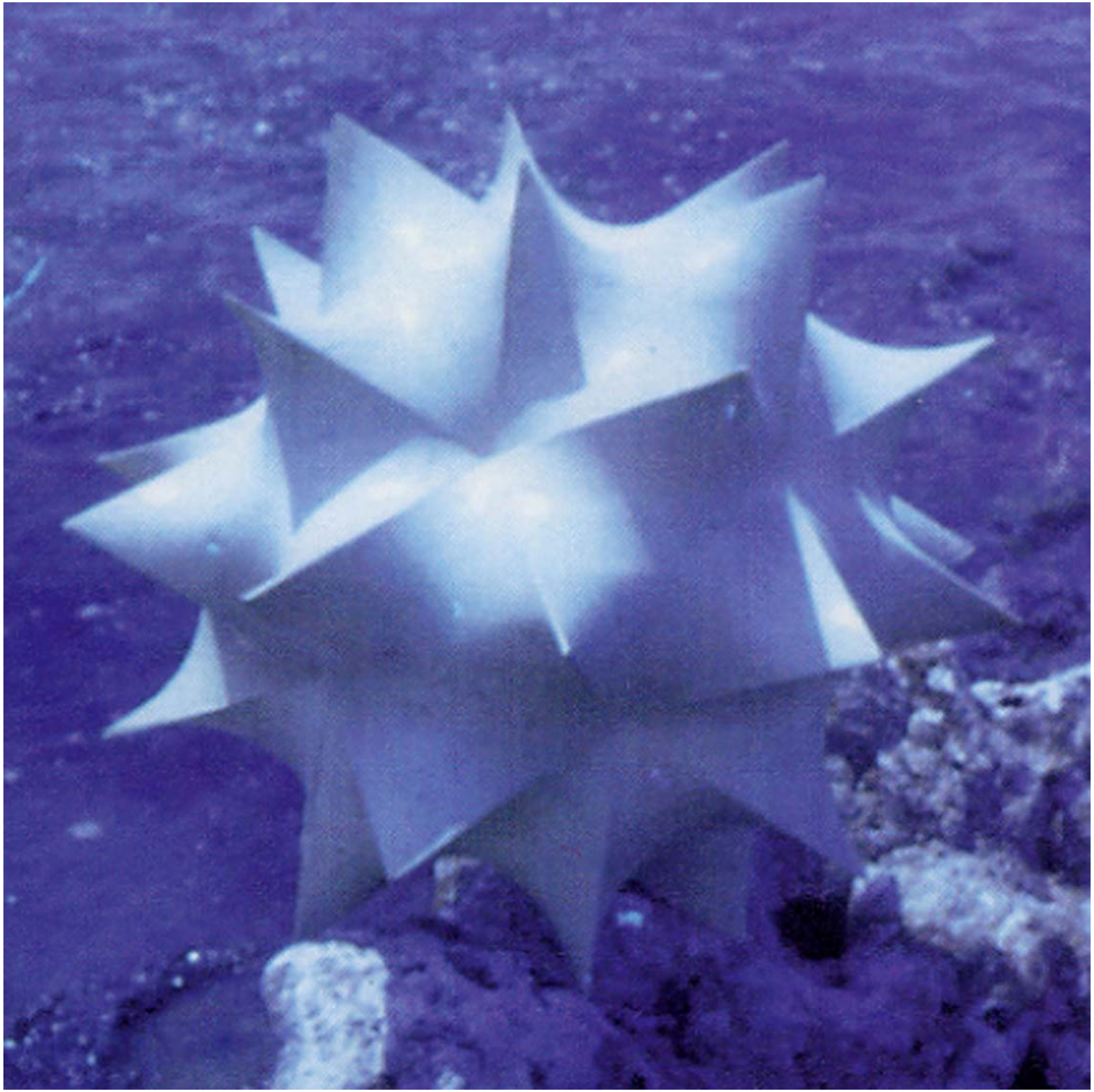
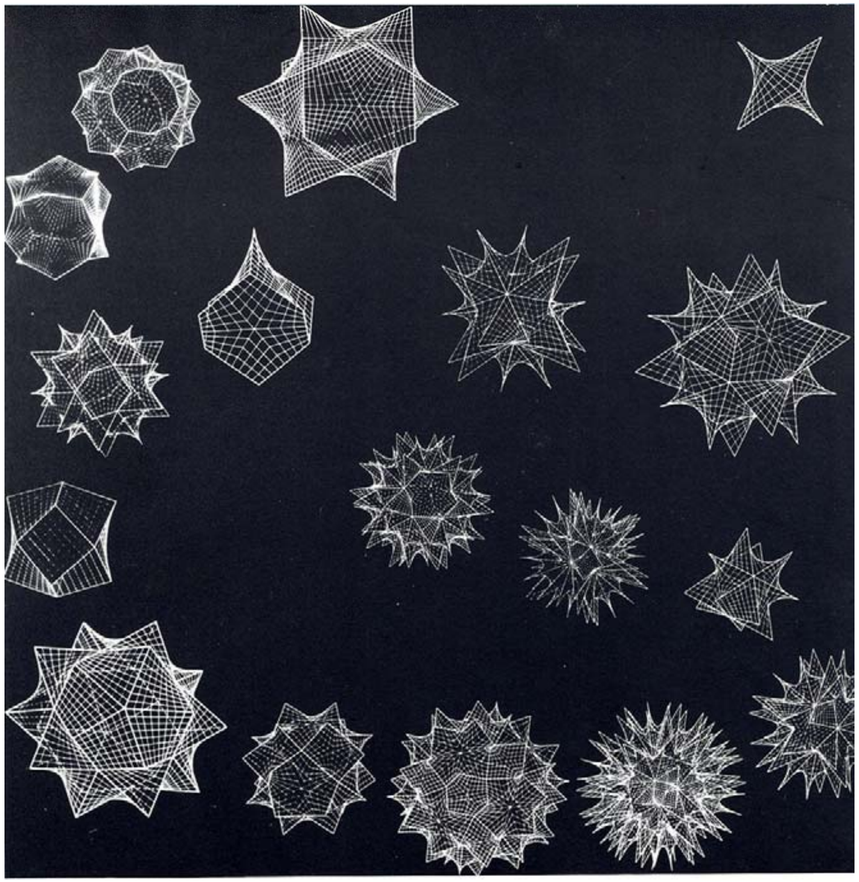
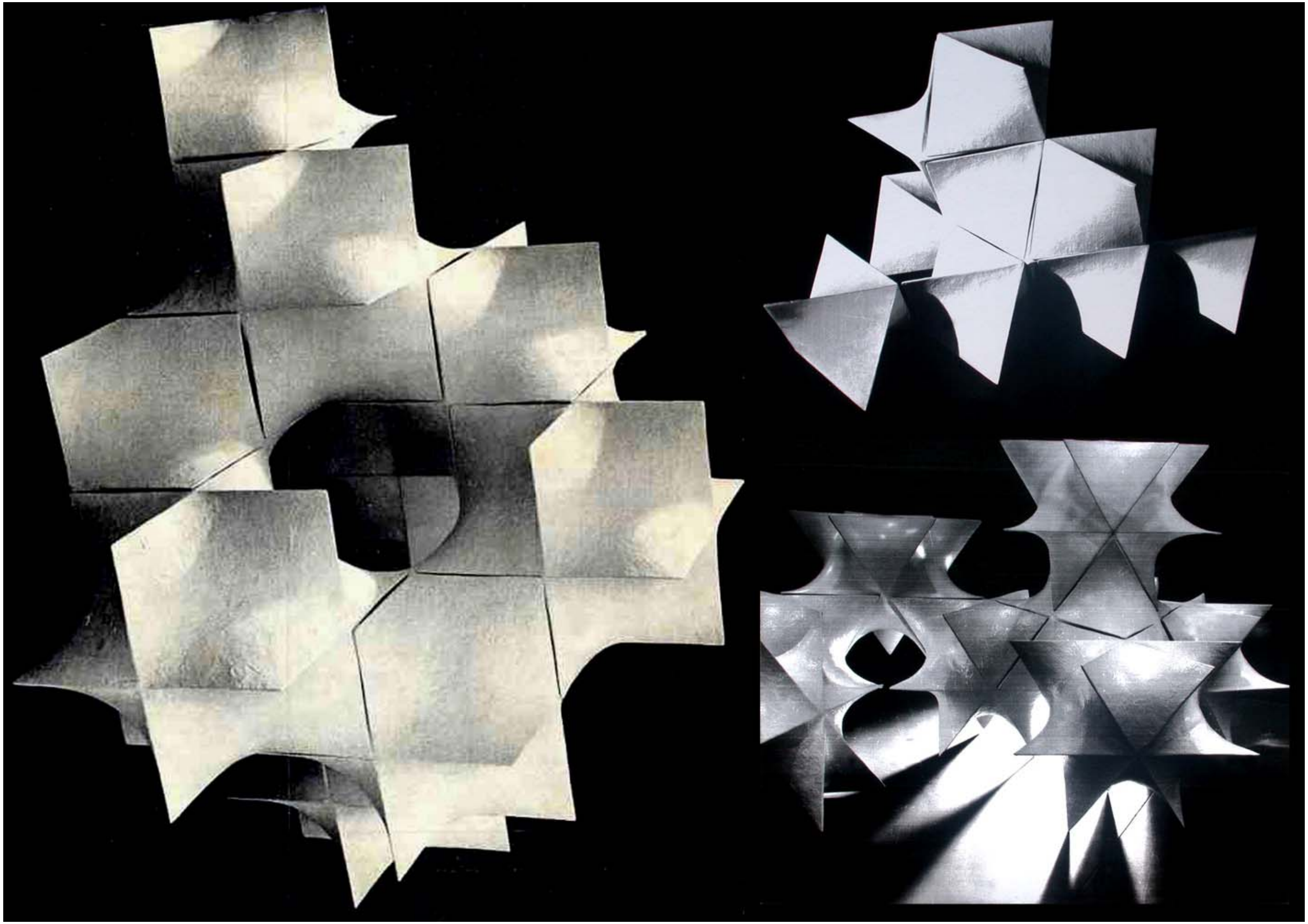
Our study of natural form", the essence of morphology, "**is part of that wider science of form which deals with the forms assumed by nature** under all aspects and conditions, and in a still wider sense, with **forms which are theoretically imaginable"**.....(On Growth and Form – D'Arcy Thompson), "Theoretically" to imply that we are dealing with causal- rational forms.

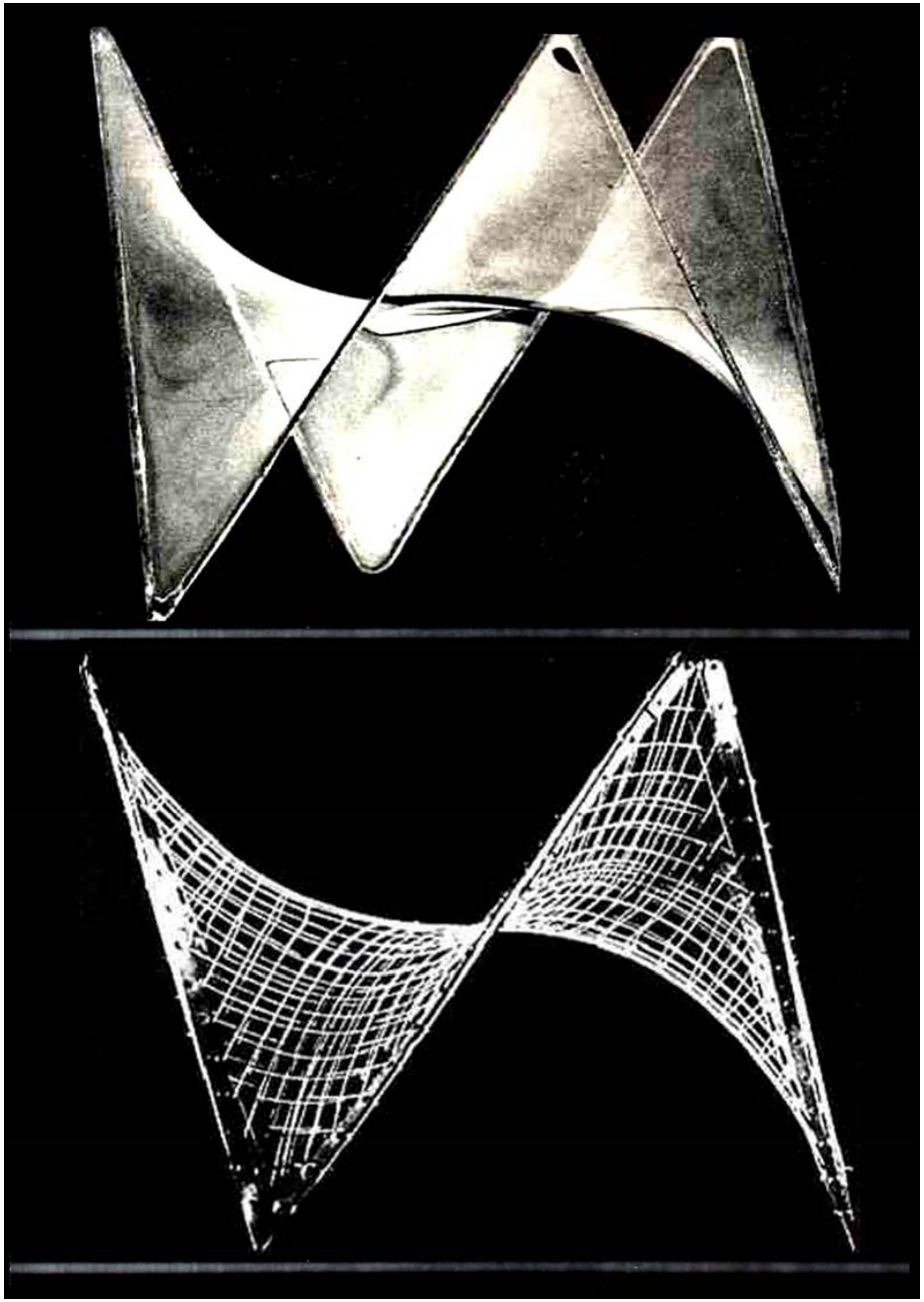


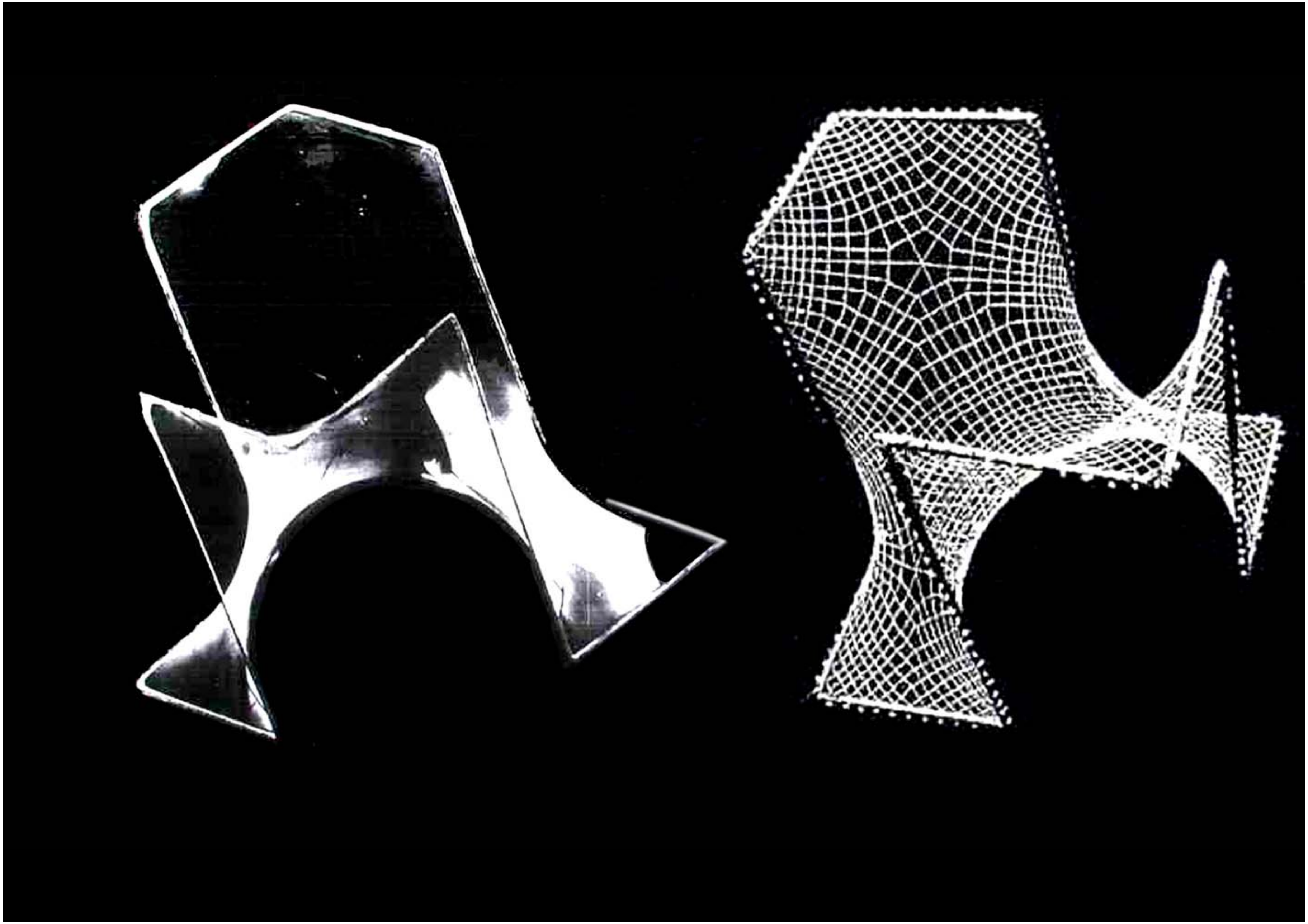


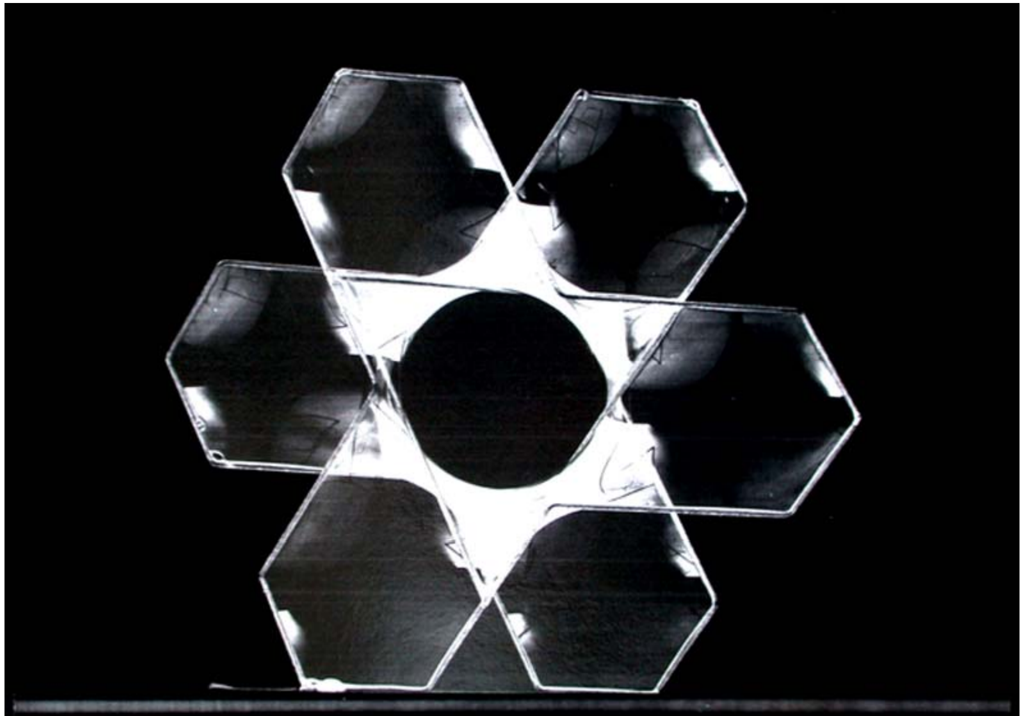


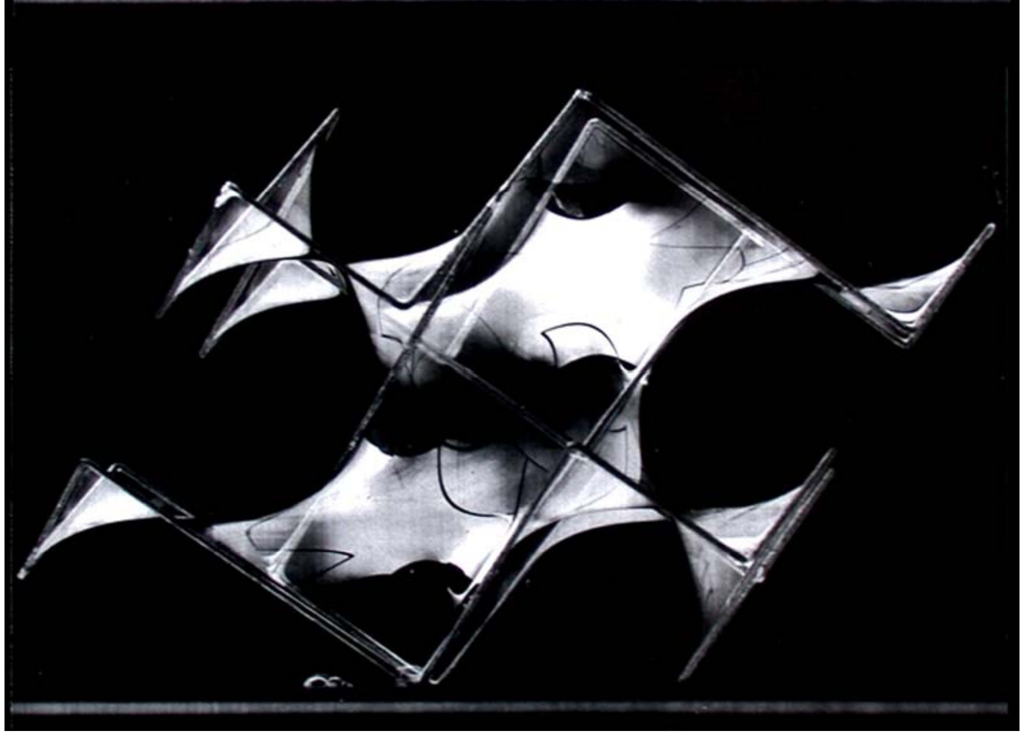
Finite Saddle Polyhedra.

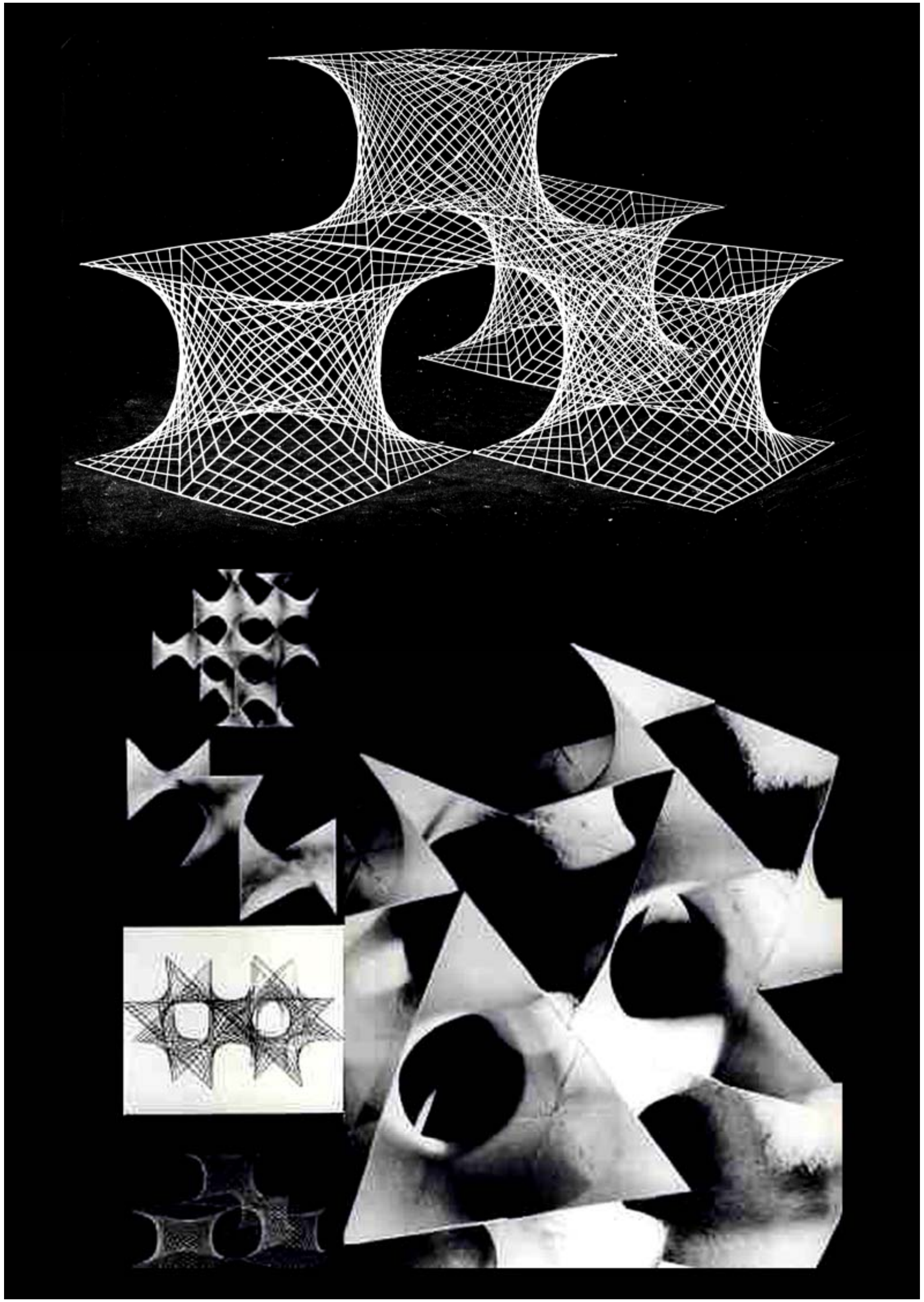


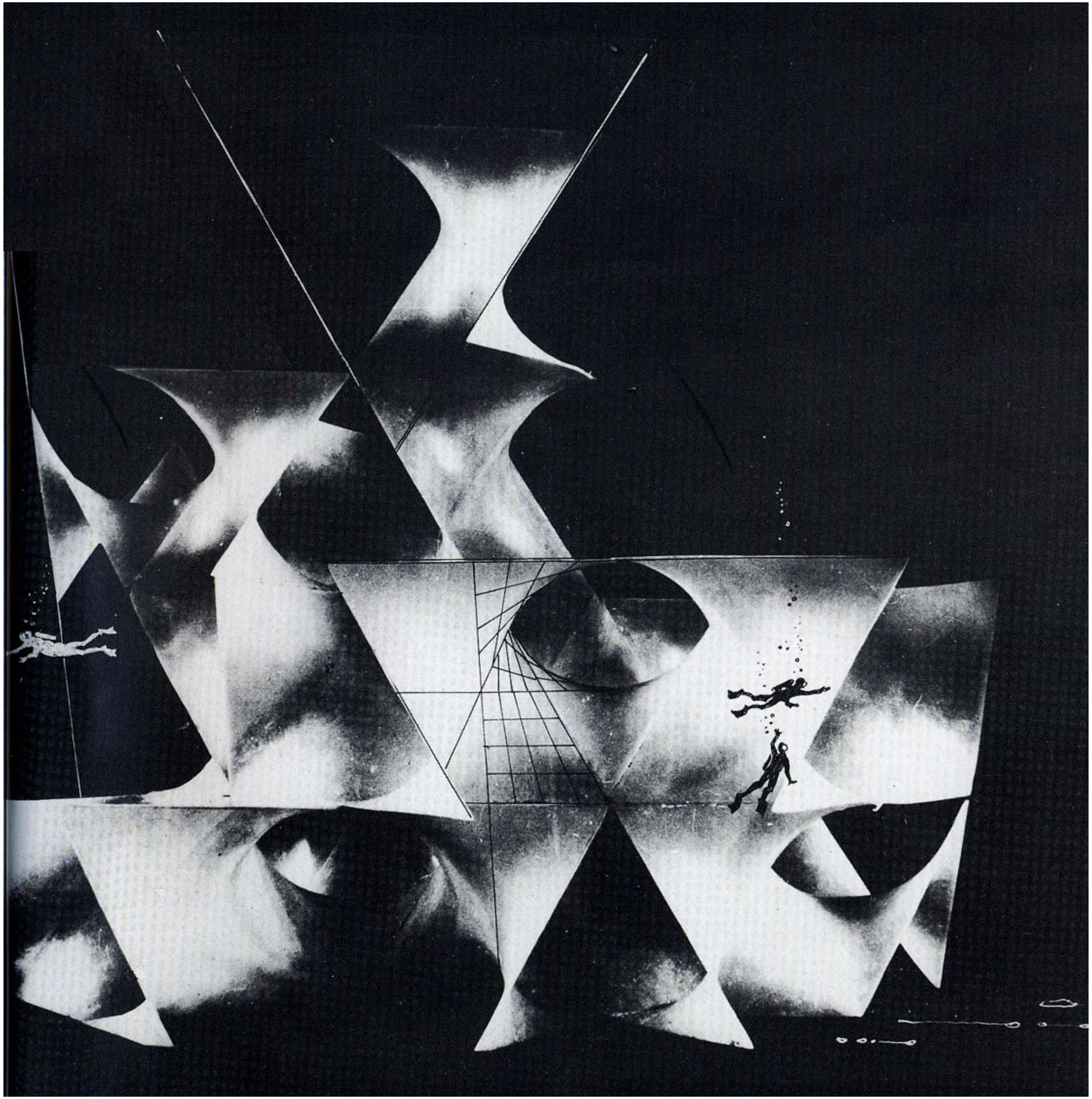


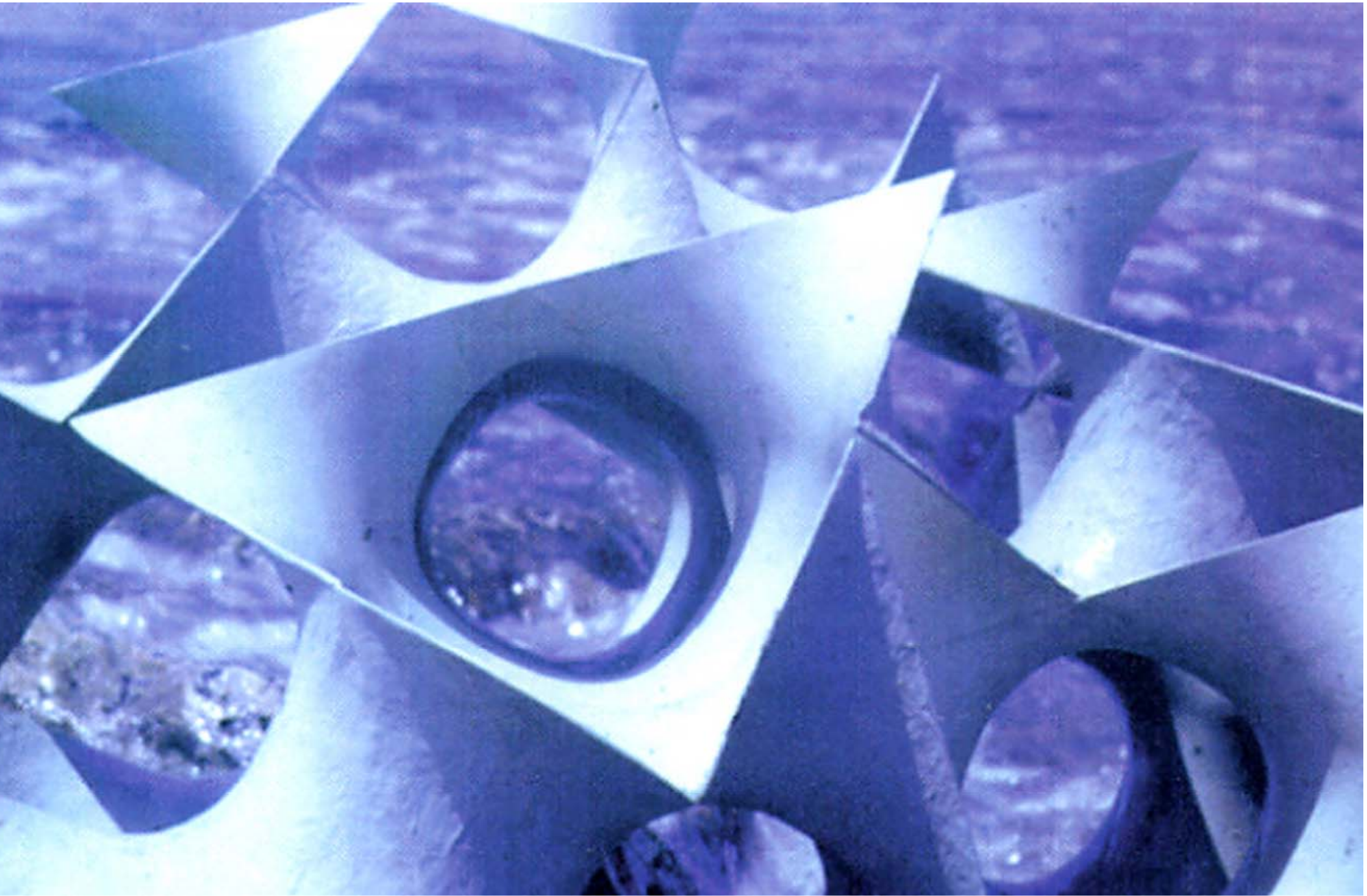


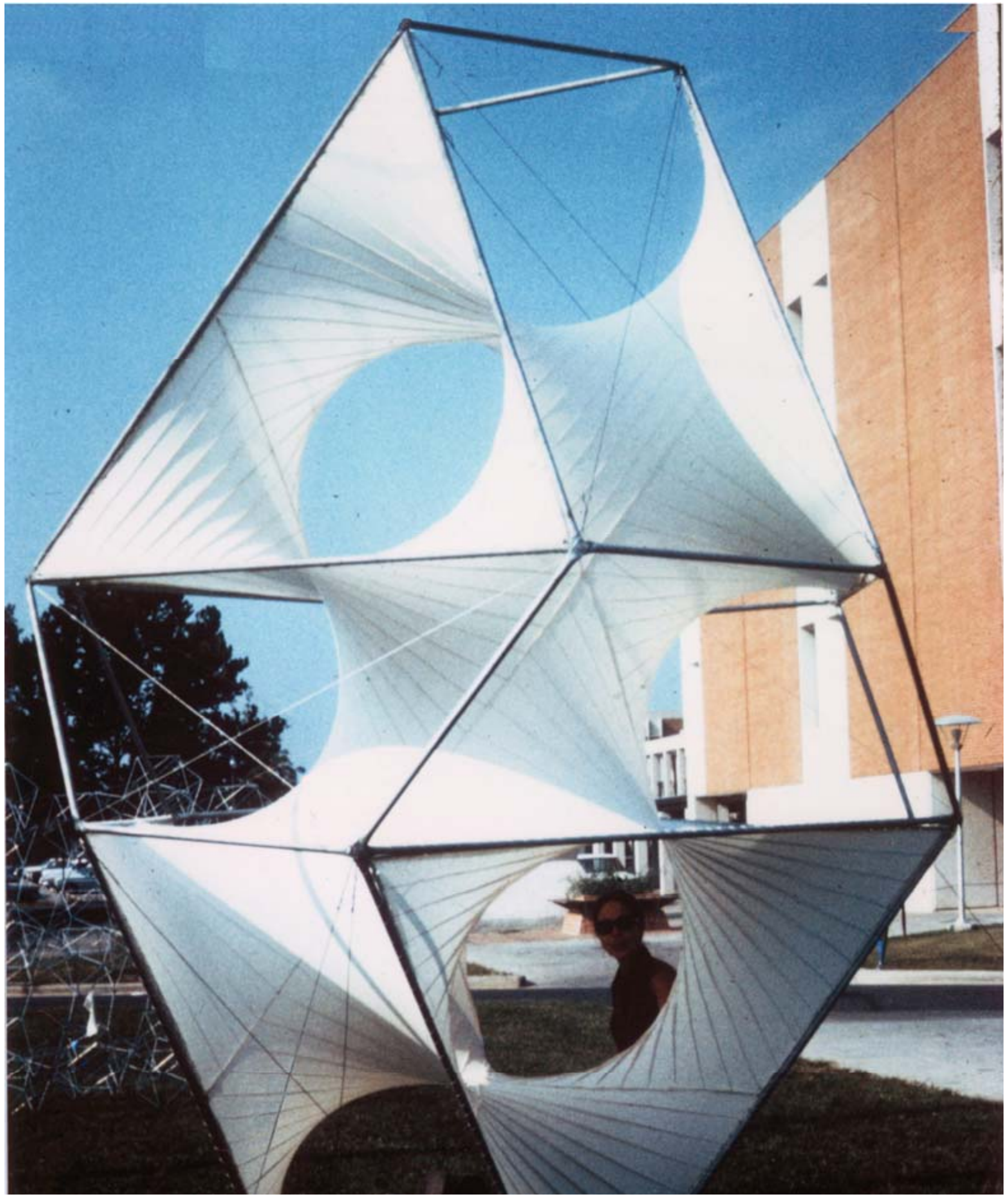


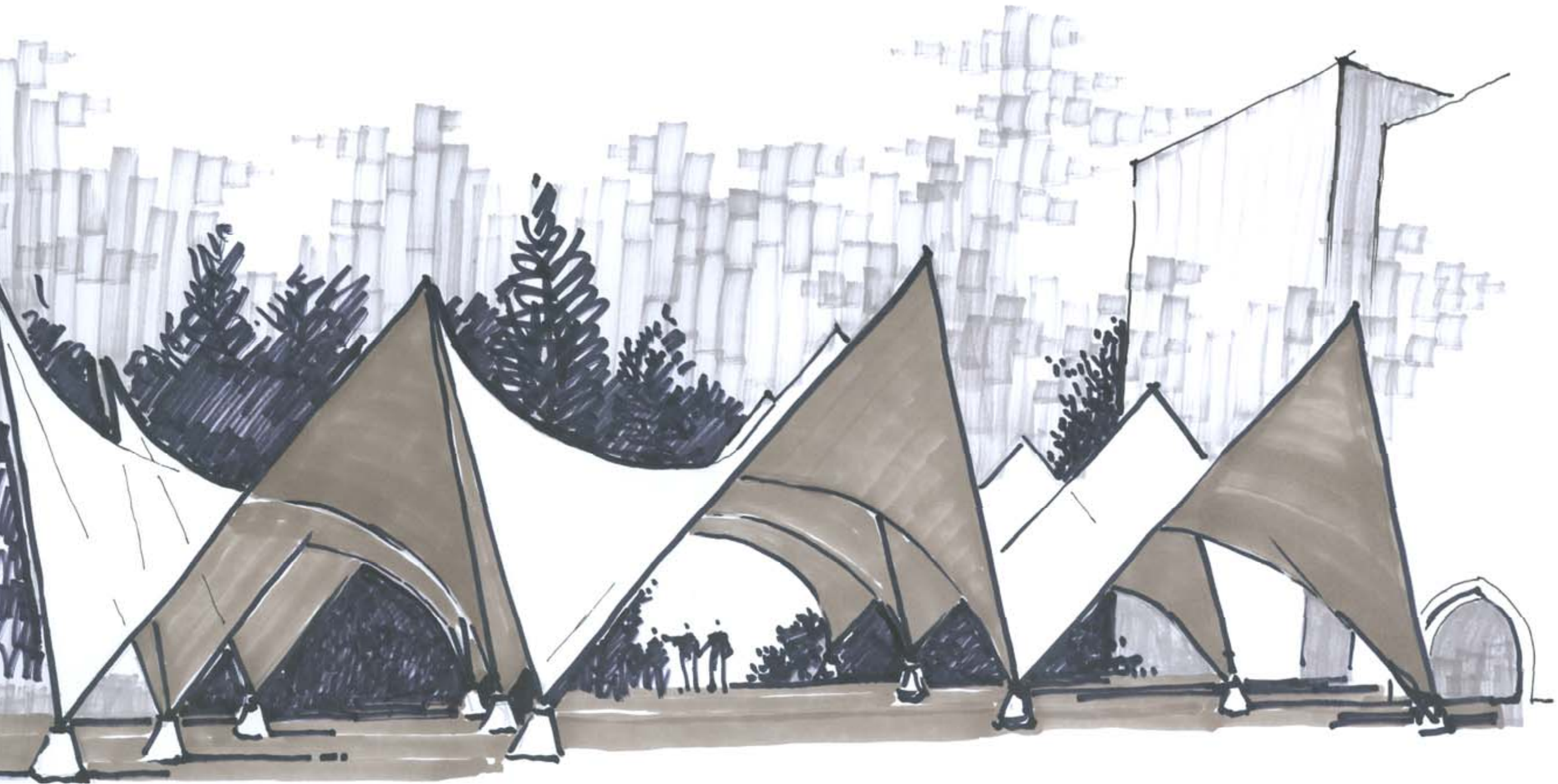


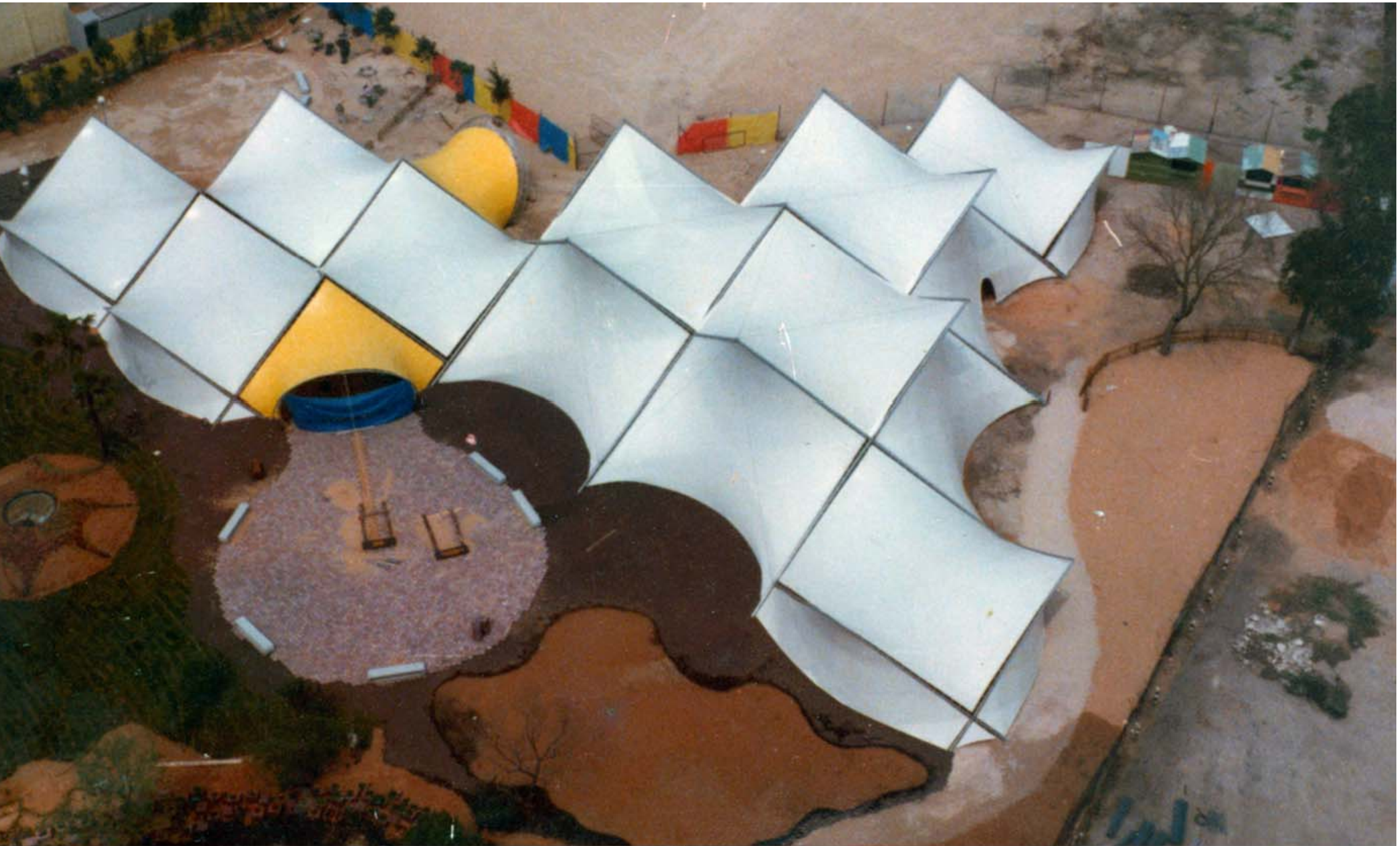
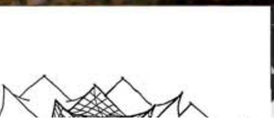


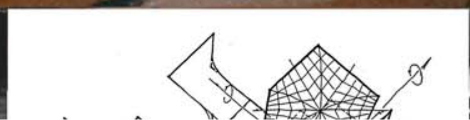


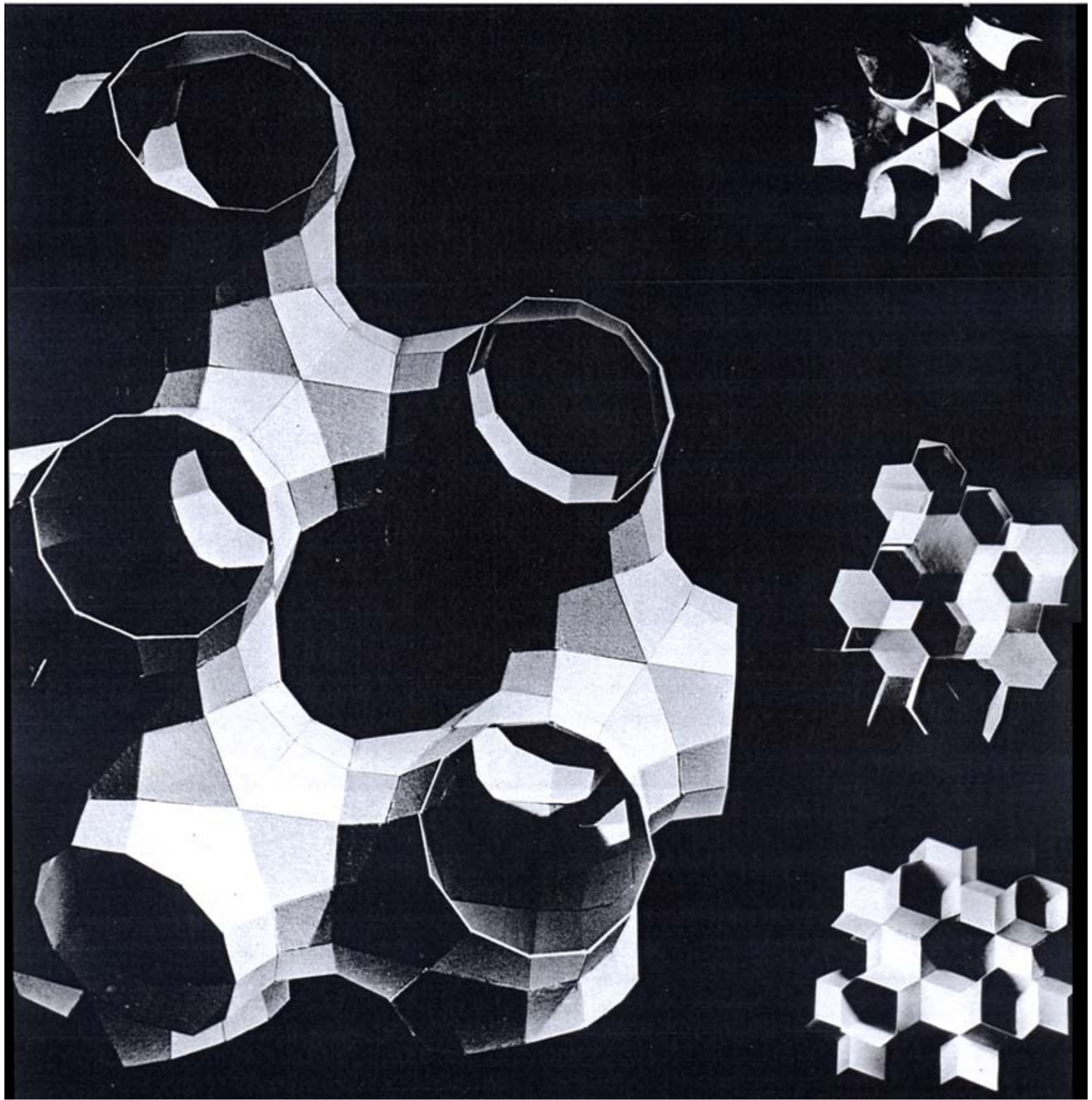


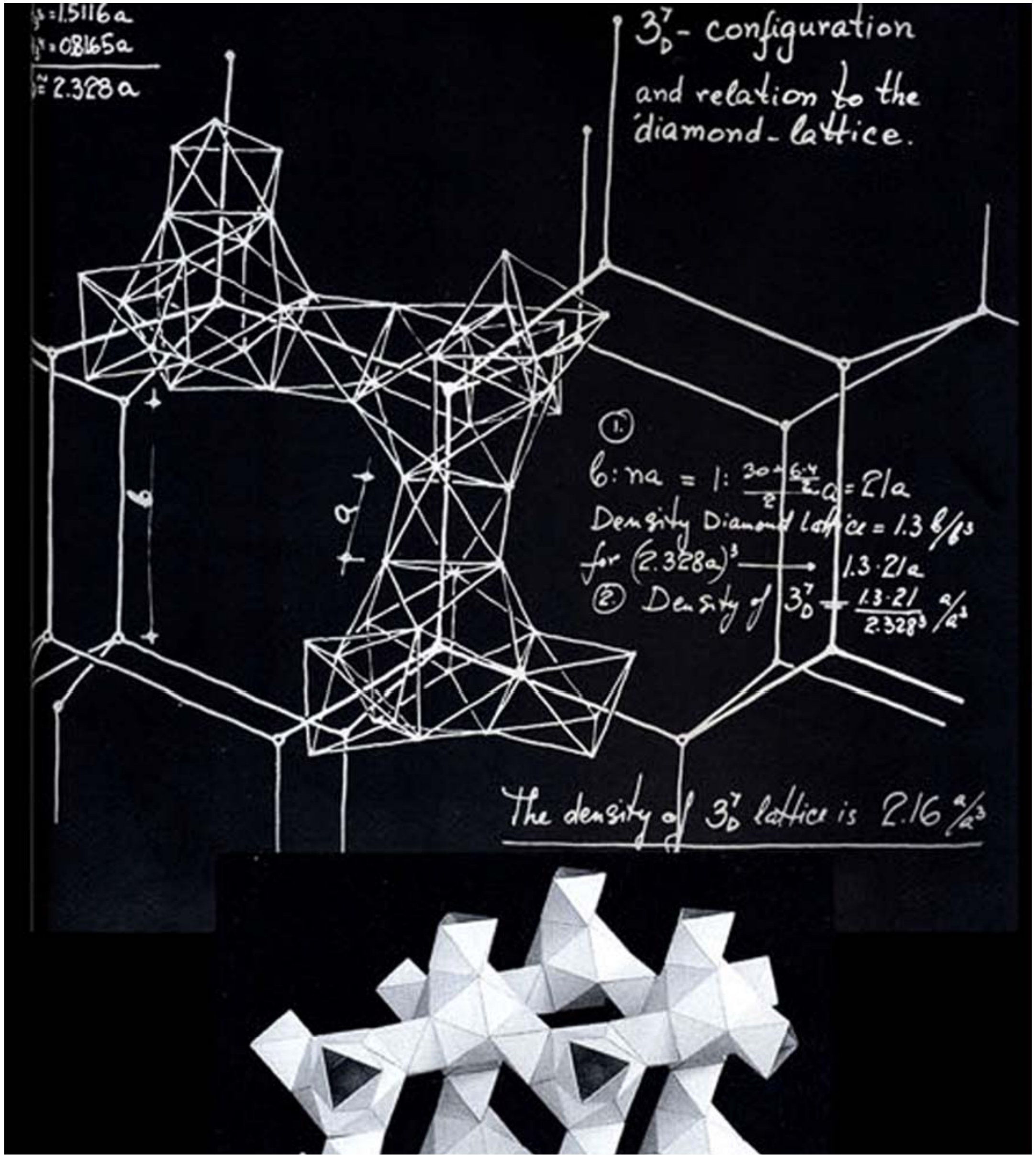


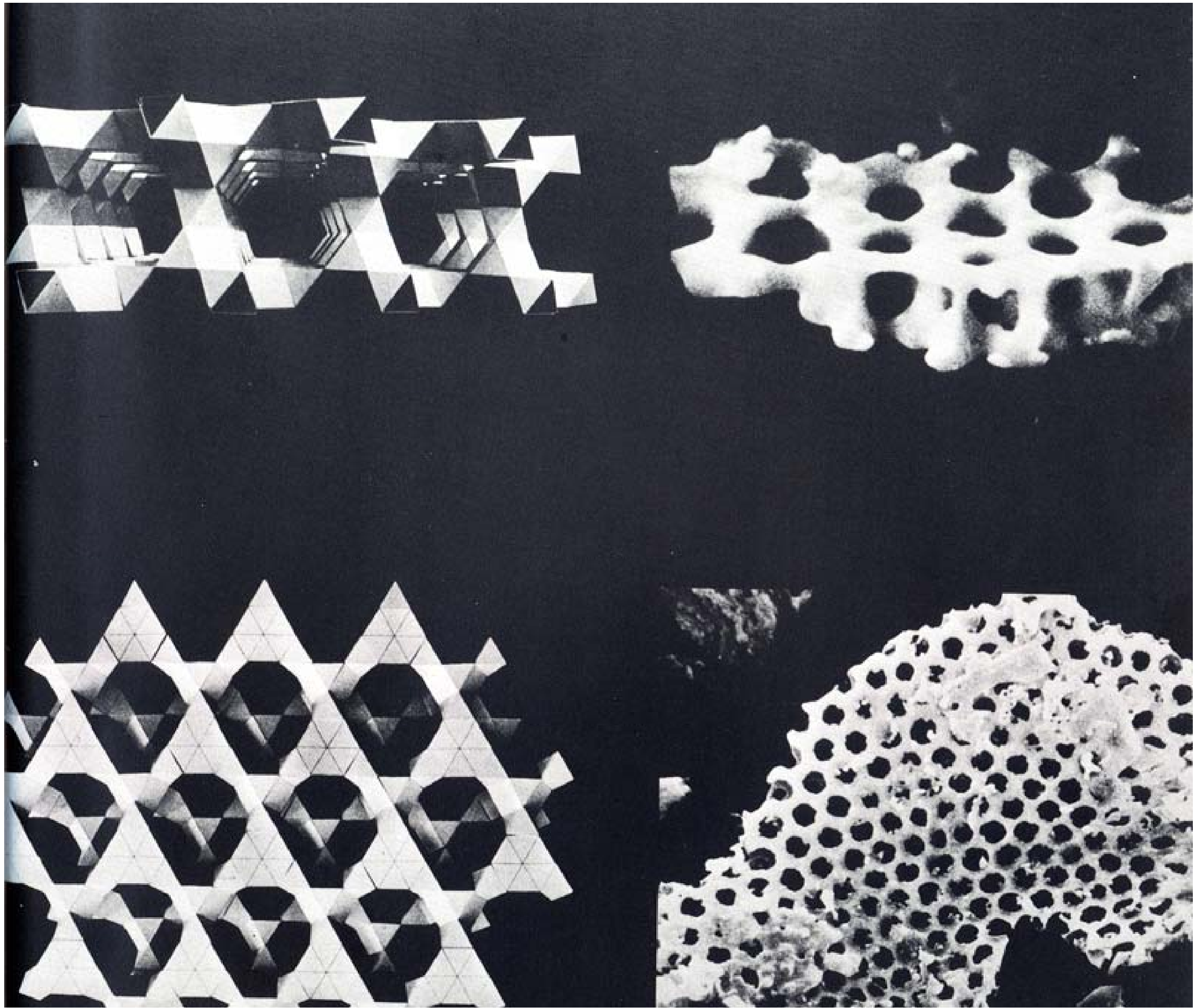


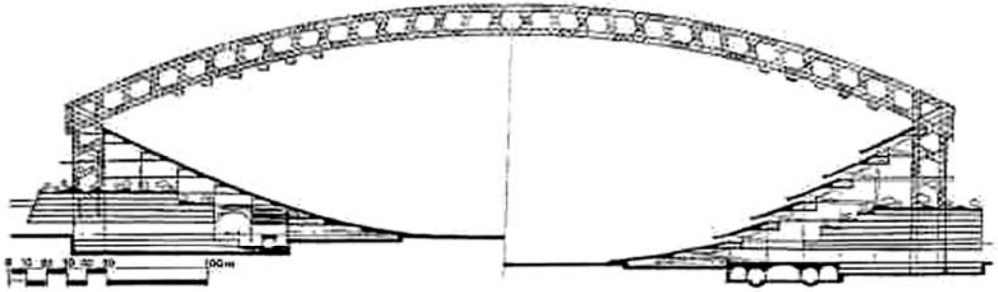



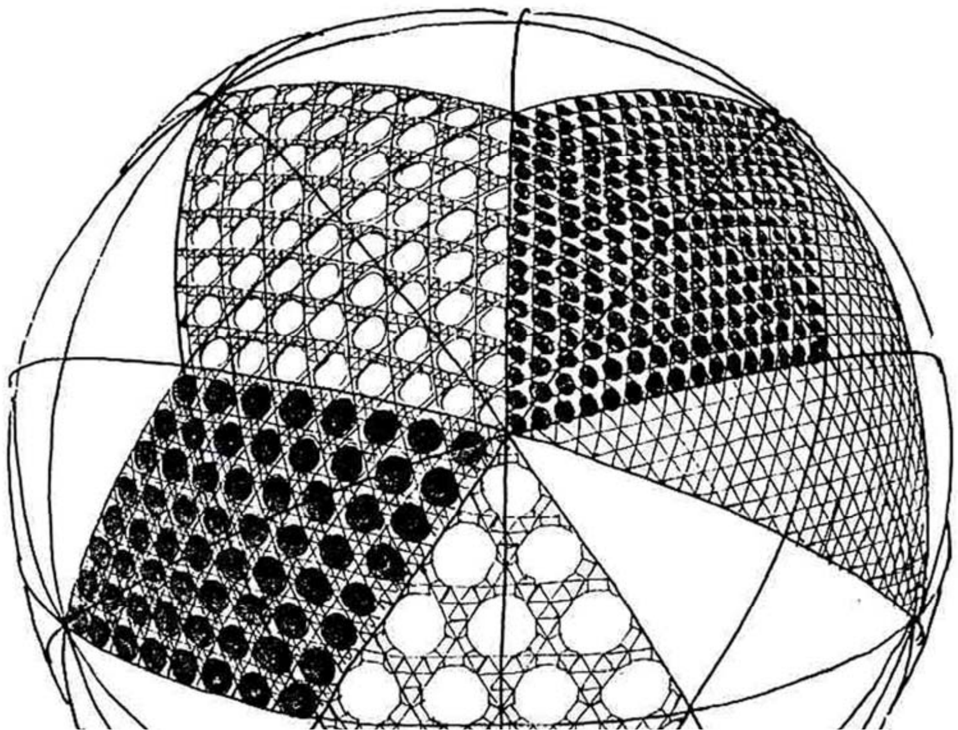


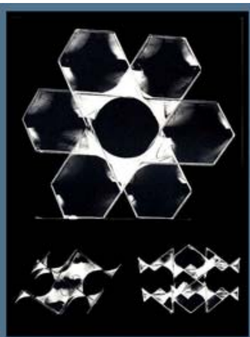
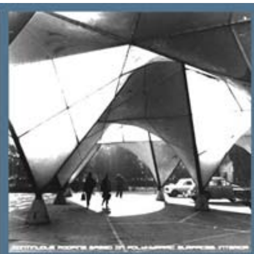




=1.5116a
=0.8165a
= 2.328a
3D7 - configuration
and relation to the
'diamond-lattice.
a
1.
Density Diamond lattice = 1.3
for (2.328a)3 → 1.3·21a
2. Density of 3D7
The density of 3D7 lattice is 2.16







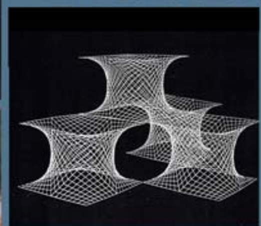

HEXAHYP-7 SHELL STRUCTURE
1969 - HAIFA ISRAEL
AQUAVILLE - PARIS BIENNALE
1969 - PARIS M.BURT

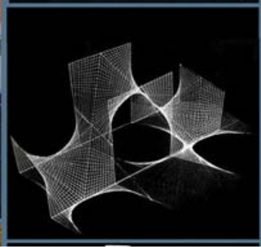


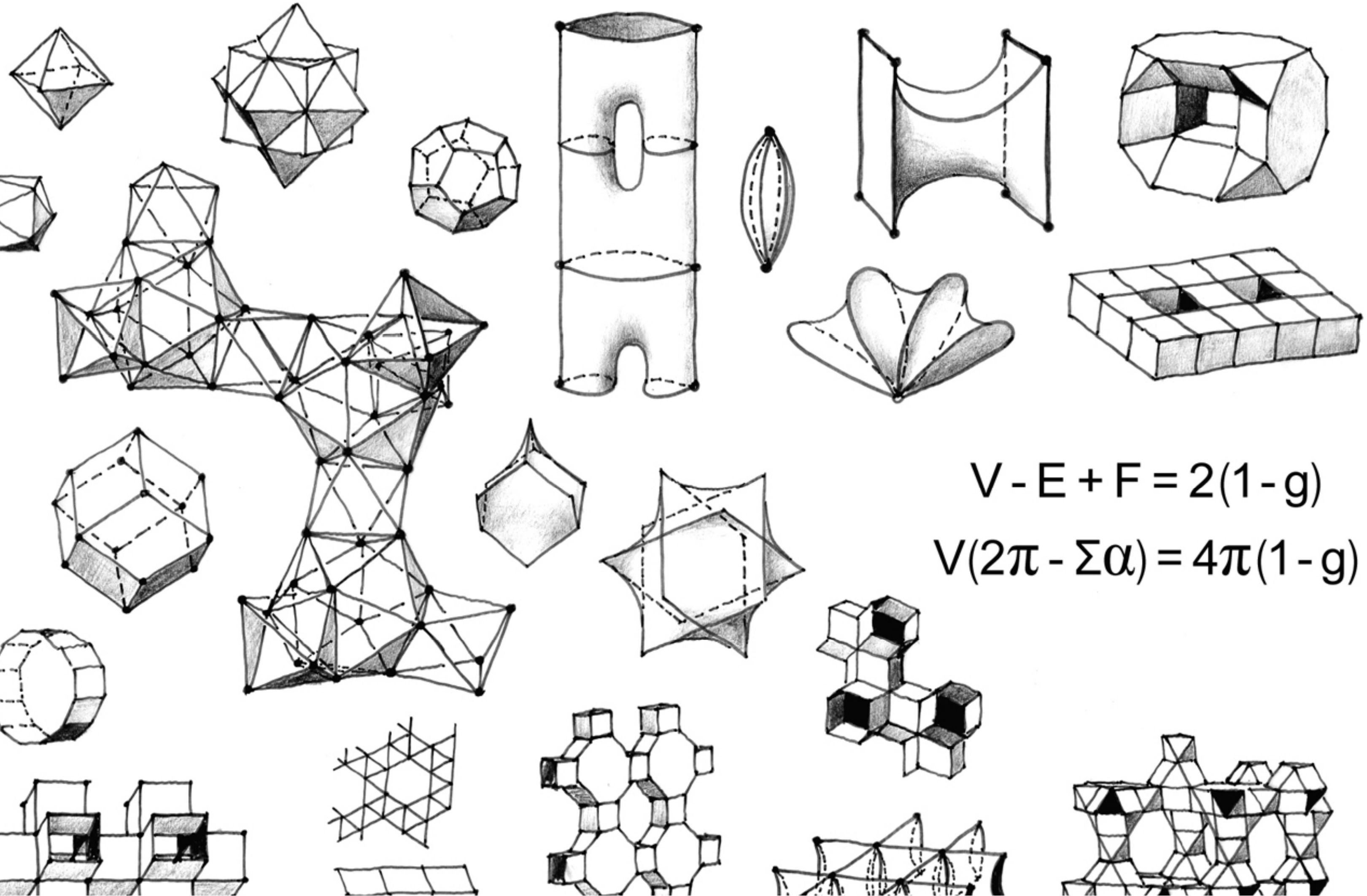
PREVIOUS RESEARCH EFFORTS ON THE THEME OF
HYPERBOLIC SURFACES AND INFINITE POLYHEDRA
AND APPLICATIONS TO LIGHT-WEIGHT STRUCTURES









$$V - E + F = 2(1 - g)$$

$$V(2\pi - \Sigma\alpha) = 4\pi(1 - g)$$

Rene Descartes, in the first half of the 17th century, while referring to convex regular polyhedra, stated that:

“The total angular deficit, of the sum of the angular deficits, taken over all the vertices of a convex polyhedron, equals 4π for (all) regular polyhedra”: $\partial \,.V = (2\pi - \Sigma\, \alpha)V = 4\pi$ **.**

Expanding the equation, to cover the oroidal and the hyperbolical domain:

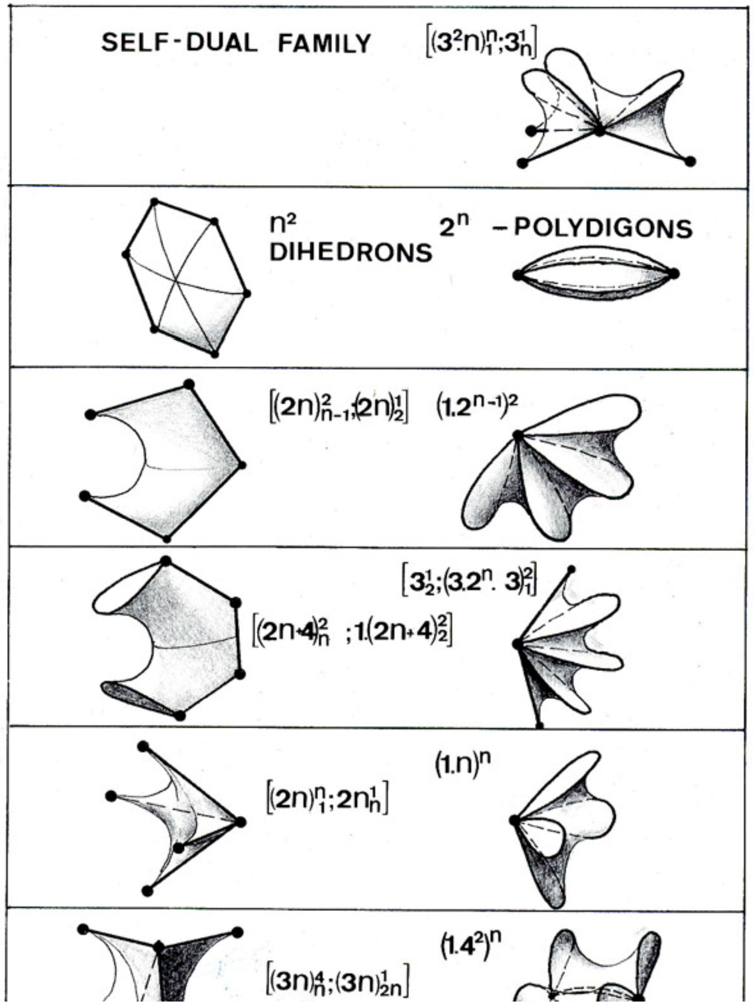
$2\pi - \Sigma\alpha)\, V = 4\pi\, (1\text{-}g)$.

Leonhard Euler, the founder of topology, stated in the so-called Euler's Theorem:
"The number *V*-E+F=K, (V, E, F, stand for vertices, Edges and Faces, respectively, with K, called the characteristic of the manifold)**, is the same for all permissible maps on the manifold."**

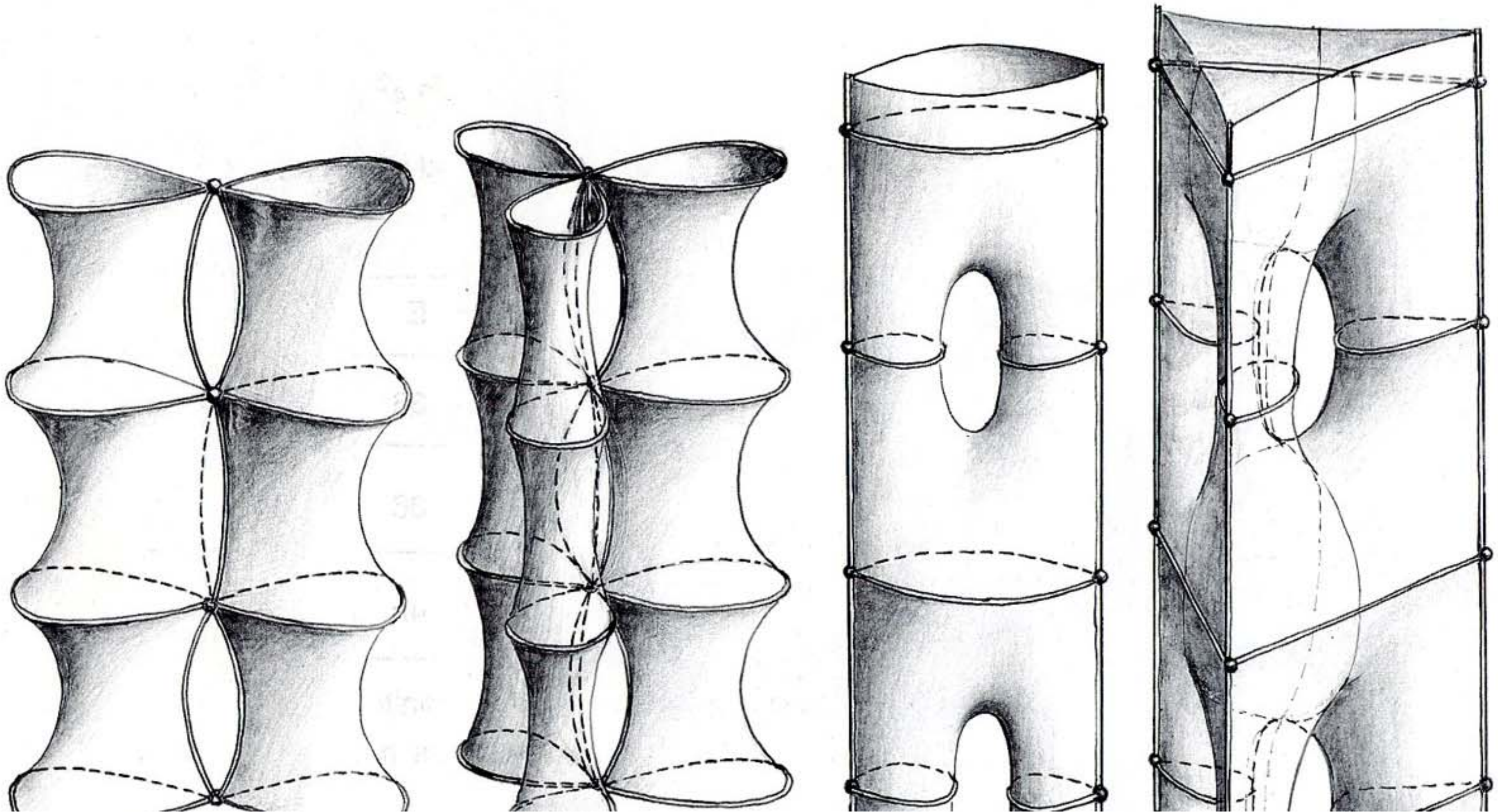
Each of the sponge surfaces may be mapped with a grid, representing eventually a sponge polyhedron.

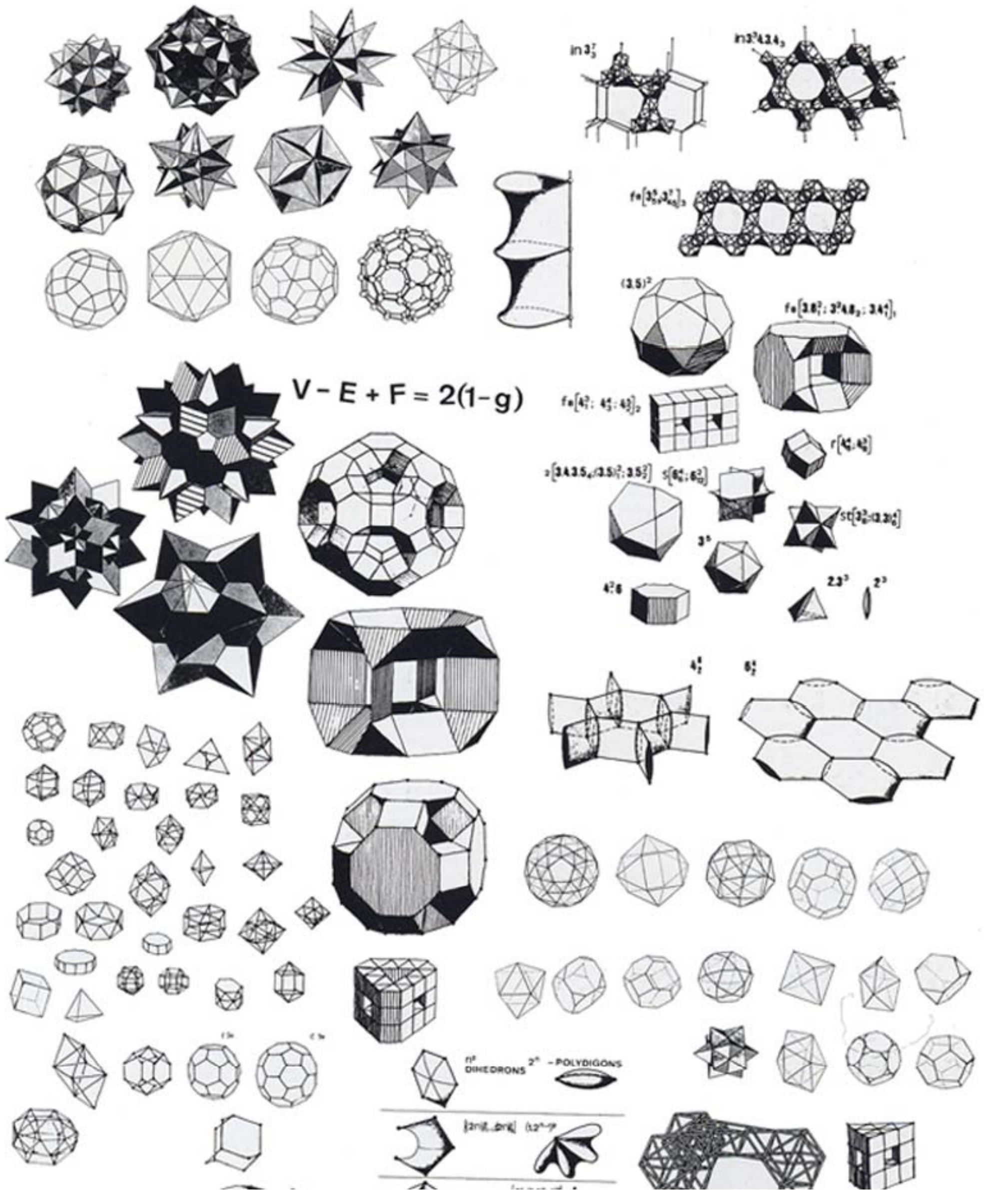
Generally speaking, **any far-reaching definition of polyhedra is admissible as long as it does not violate Euler's formula**.

Floral polyhedra, families within the g=0 domain Aaranged according to their dual pairs.



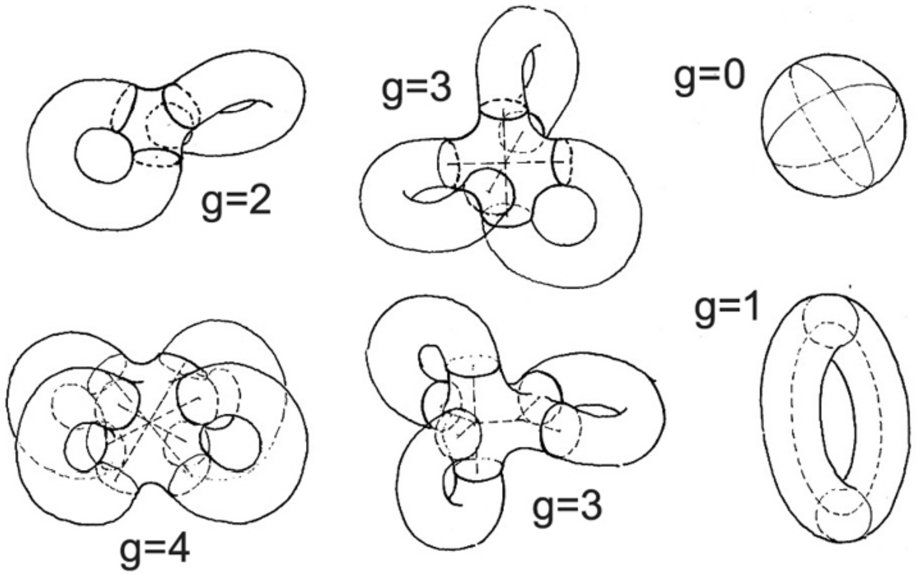
Periodic Floral Infinite
Polyhedra.

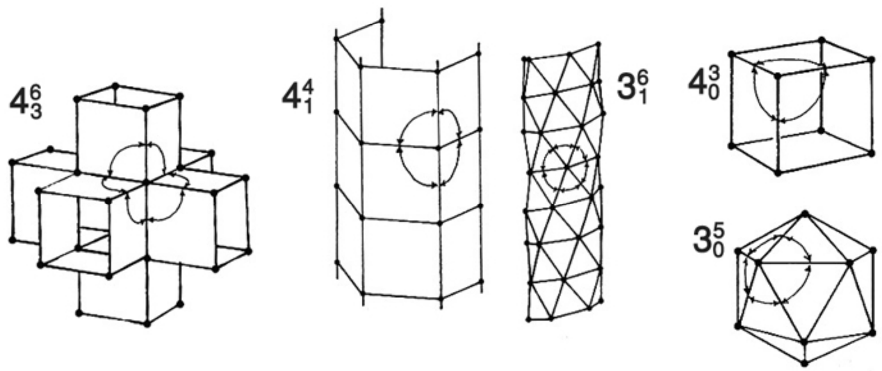



V − E + F = 2(1−g)
DIHEDRONS
POLYDIGONS

‘THE PERIODIC TABLE OF THE POLYHEDRAL UNIVERSE’

The periodic Table of the Polyhedral Universe is a **tabular arrangement of all known and hypothetical polyhedra, which comply with the celebrated Euler’s formula** . The ‘Table’ is constructed on the basis of **thoroughly selected primary parameters of the polyhedral phenomenon,** namely the $\mathbf{Val.}_{AV.}$ – (Average Valency – number of edges of a polyhedron which meet in a vertex), $\boldsymbol{\Sigma\alpha}._{AV.}$ – (Average Sum of angles of the face polygons in a vertex, and in a wider sense, the total average curvature of a vertex region), and **g** – (genus of the 2-d manifold of the polyhedron)

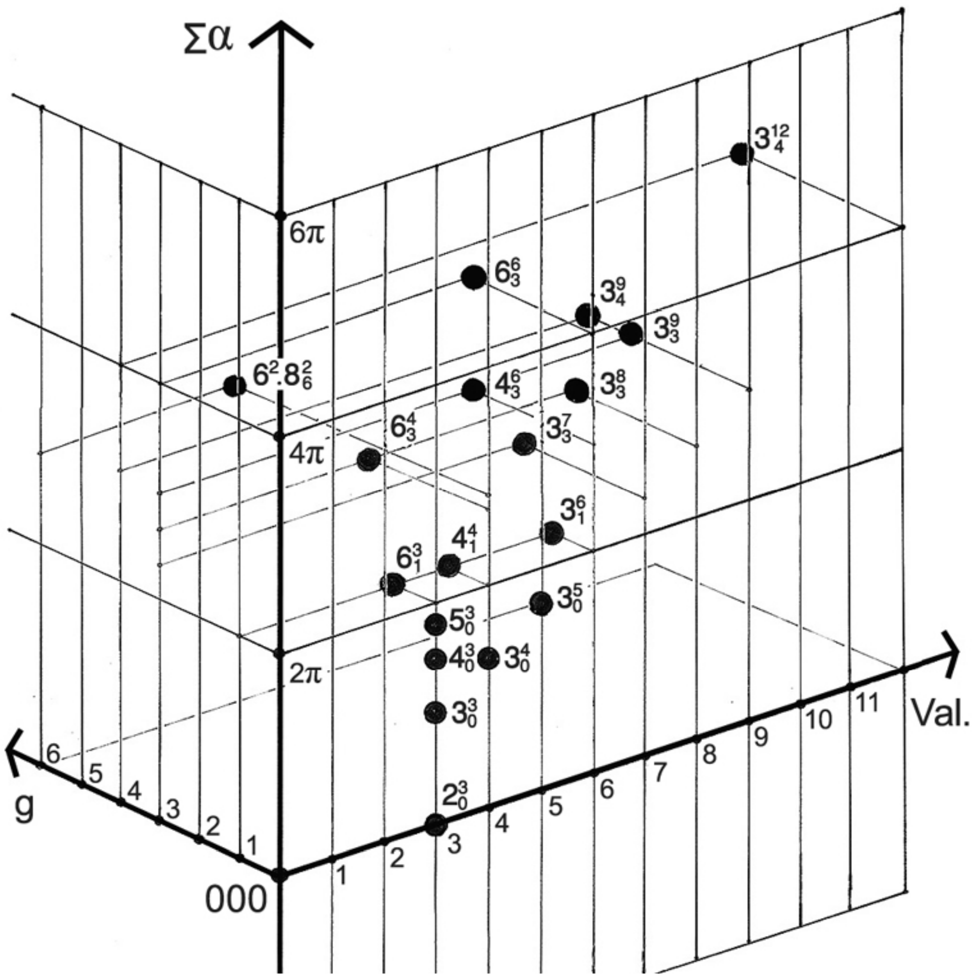




	4_0^3	3_0^5	4_1^4	3_1^6	4_3^6
$\Sigma\alpha$	270	300	360	360	540

The primary parameters of $V\text{al.}_{AV.}$, $\Sigma\alpha_{AV.}$ and g, seem to capture the essence of the polyhedral topological nature, and when used as coordinates of a Cartesian 3D space, provide for an environment, in which every conceivable individual 3D polyhedron has a unique point representation .

All shared properties are posing as discernible, mathematically embraced location patterns



Σα
6π
4π
2π
000
g
Val.
1
2
3
4
5
6
7
8
9
10
11
3_4^{12}
6_3^6
3_4^9
3_3^9
$6^2.8_6^2$
4_3^6
3_3^8
6_3^4
3_3^7
3_1^6
4_1^4
6_1^3
3_0^5
5_0^3
4_0^3
3_0^4
3_0^3
2_0^3

Polyhedra with E=12 within the g=0 domain.

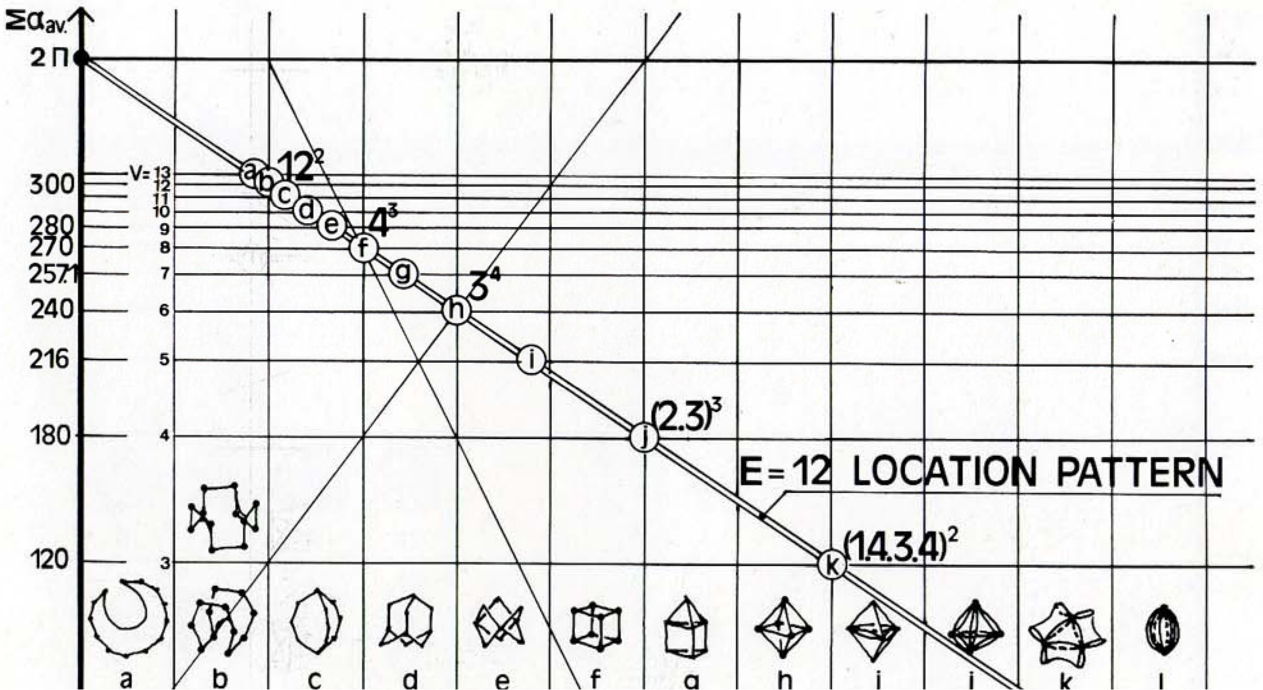
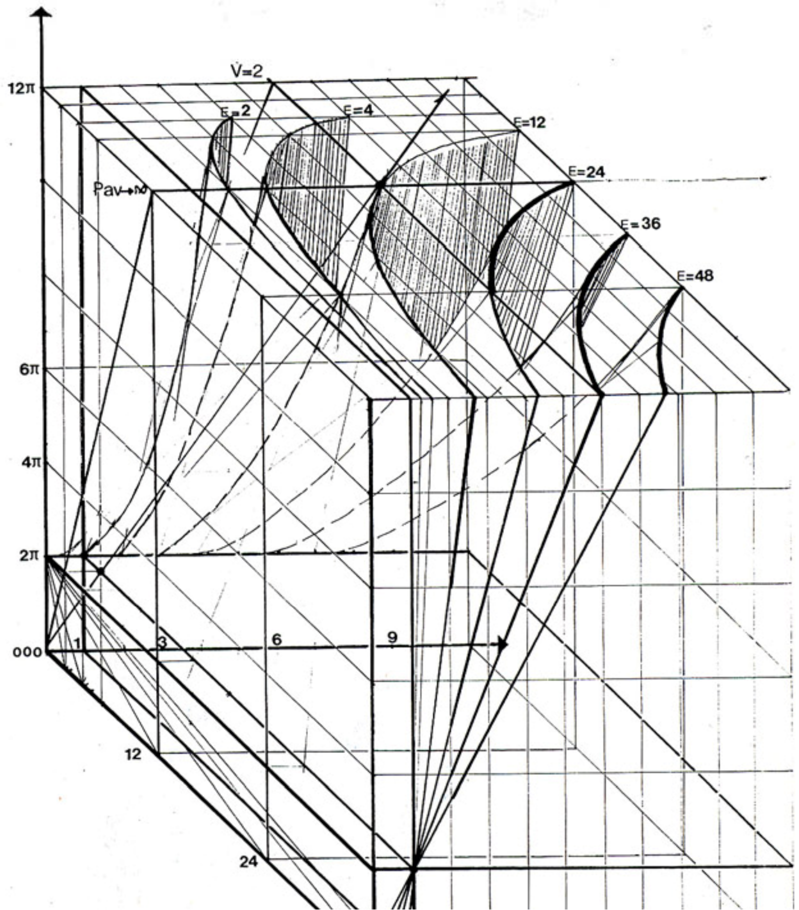
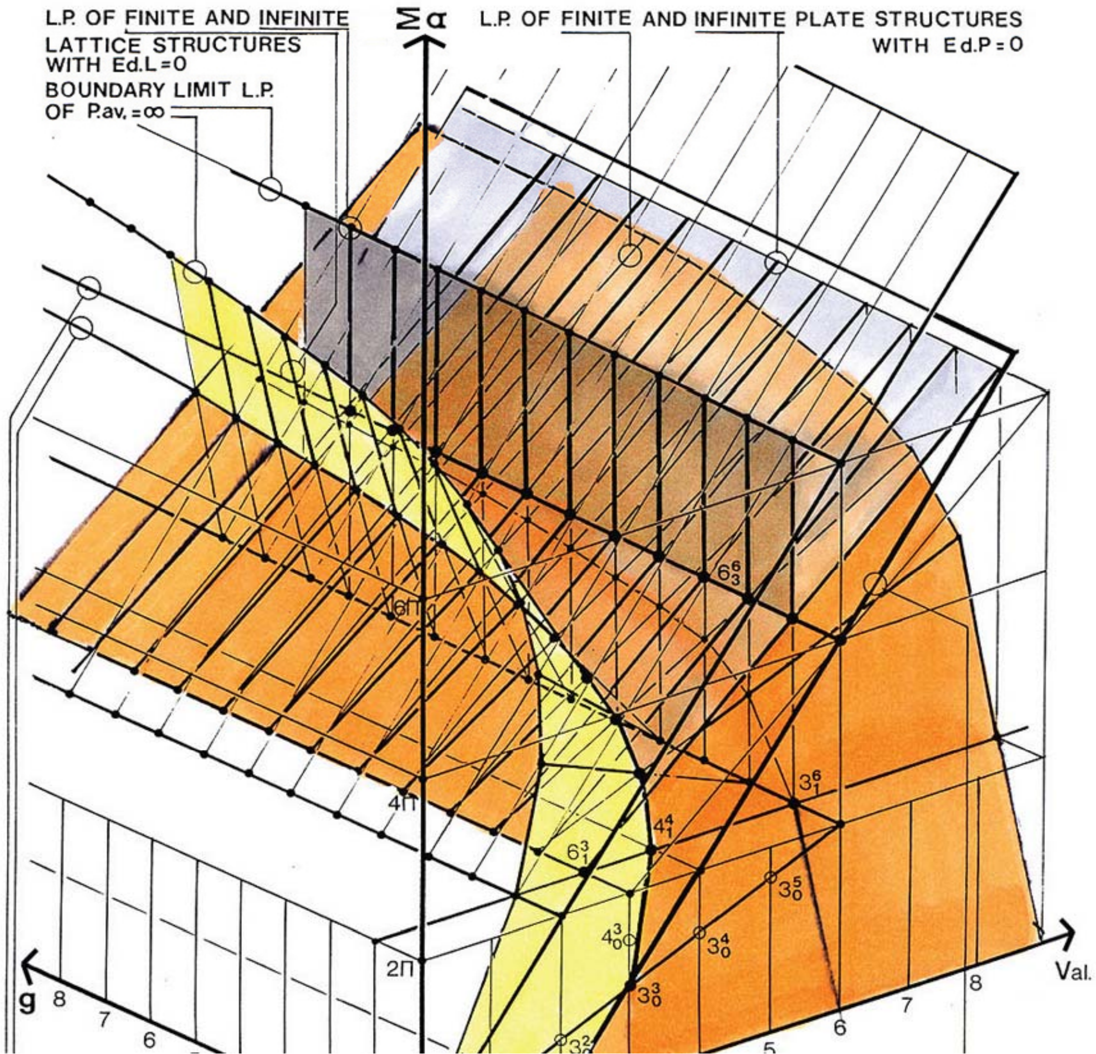
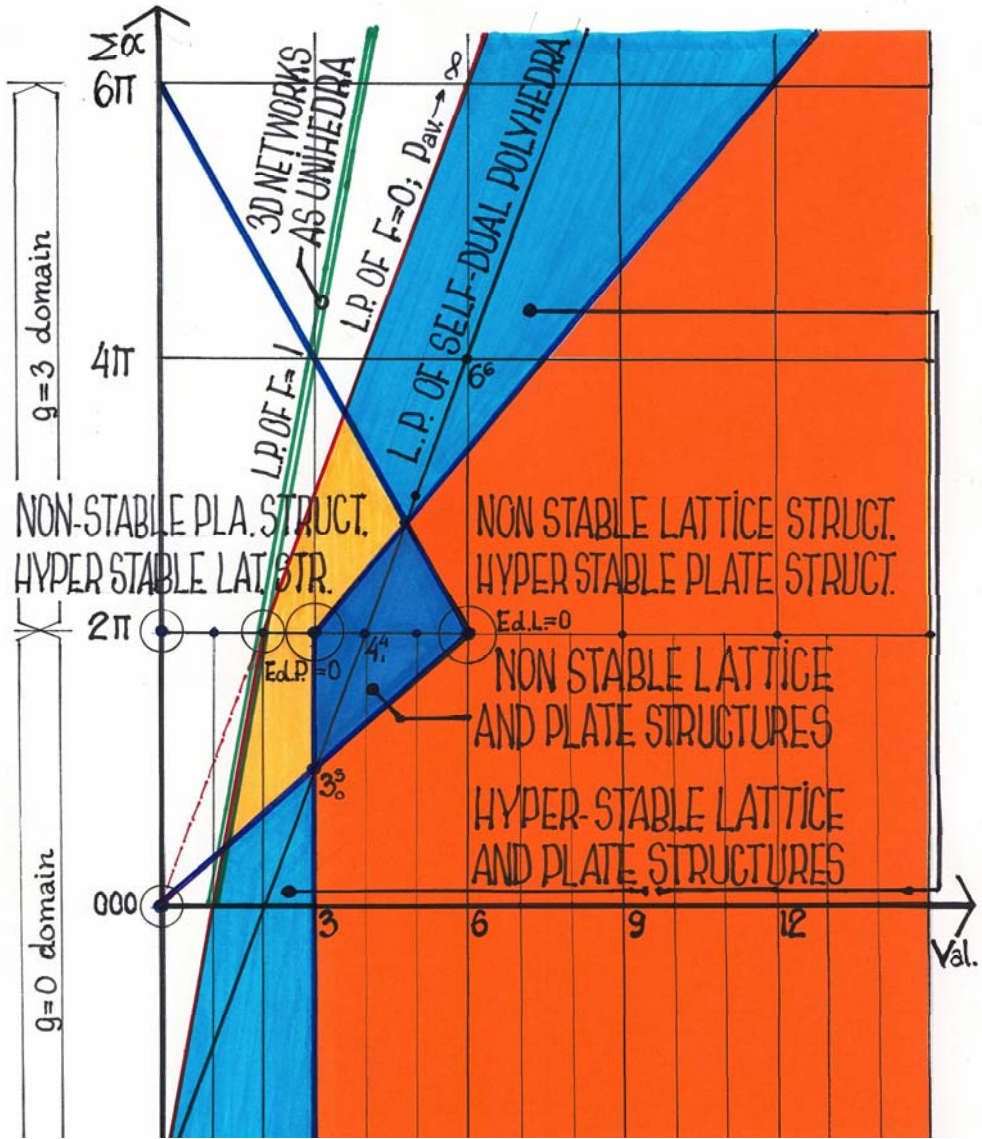


Fig. 34
Quadratic doubly curved surfaces as location patterns of polyhedra sharing the same number of edges.



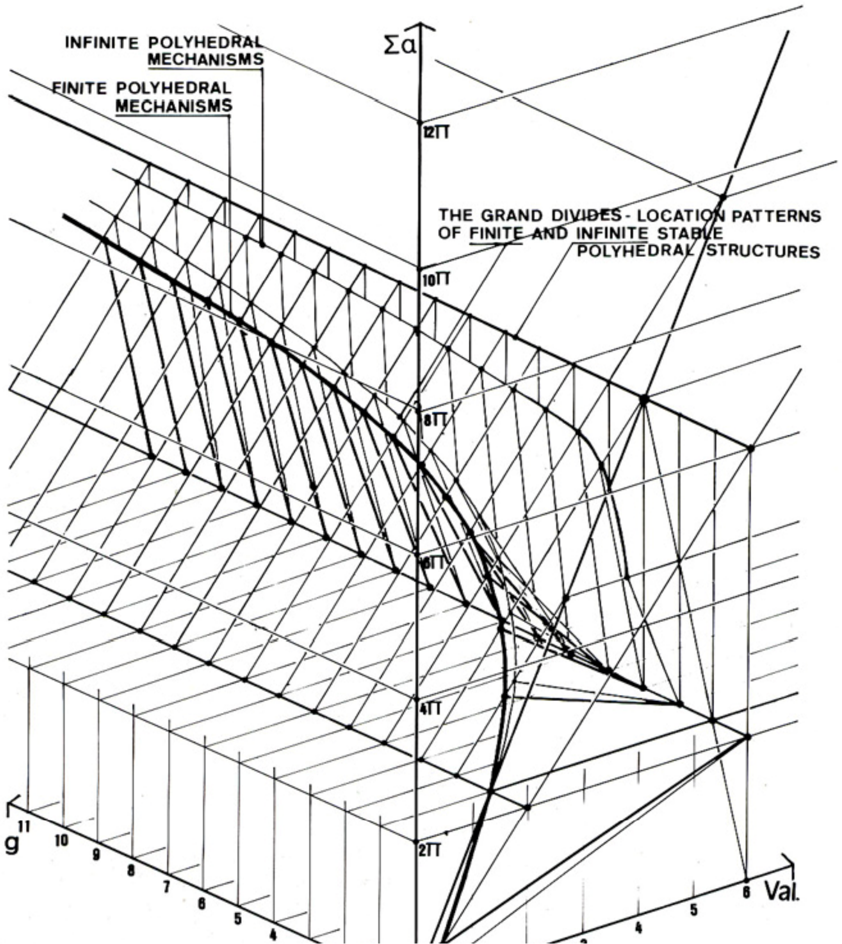


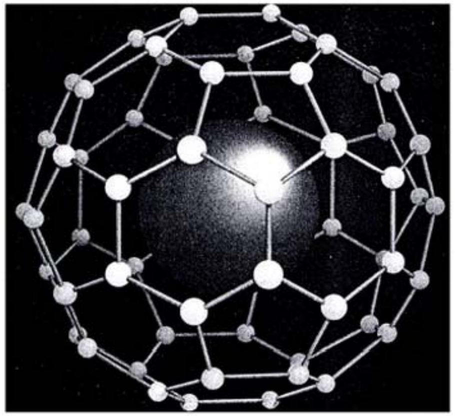
L.P. OF FINITE AND INFINITE
LATTICE STRUCTURES
WITH Ed.L = 0
BOUNDARY LIMIT L.P.
OF P.av. = ∞
L.P. OF FINITE AND INFINITE PLATE STRUCTURES
WITH Ed.P = 0
Σα
Val.
g
6Π
4Π
2Π
8
7
6
5
6
7
8



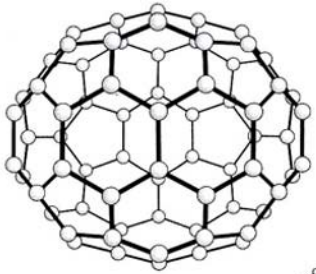
Σα
6π
4π
2π
000
3
6
9
12
Val.
g=3 domain
g=0 domain
3D NETWORKS AS UNIHEDRA
L.P. OF F=0; Pav.→∞
L.P. OF SELF-DUAL POLYHEDRA
L.P. OF F=1
NON-STABLE PLA. STRUCT.
HYPER STABLE LAT. STR.
NON STABLE LATTICE STRUCT.
HYPER STABLE PLATE STRUCT.
Ed.L.=0
Ed.P.=0
NON STABLE LATTICE AND PLATE STRUCTURES
HYPER-STABLE LATTICE AND PLATE STRUCTURES

Location patterns of finite and infinite polyhedral mechanisms in all g-domains.

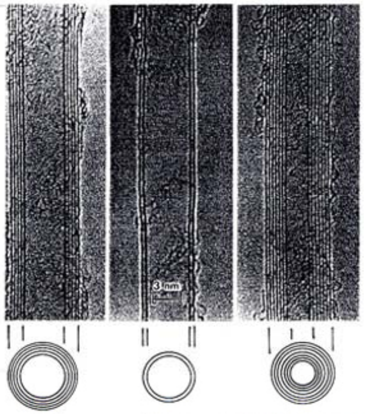


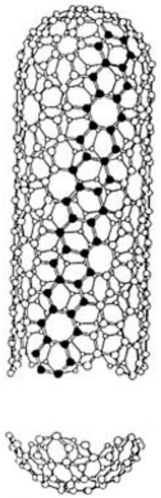


What makes the fullerenes so new and so special is the prospect of forming them with atoms on the *inside*. This computer-generated image shows an atom inside a C_{60} cage. Surprisingly, metal-containing fullerenes do not follow the same patterns of stability as the equivalent 'empty' fullerenes. A lanthanum atom encapsulated inside C_{82} turned out to be more stable than LaC_{60}.

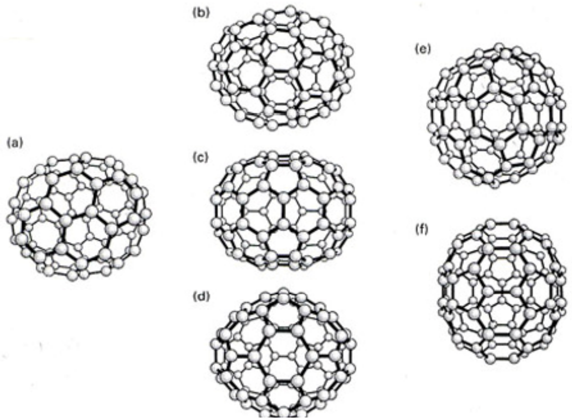


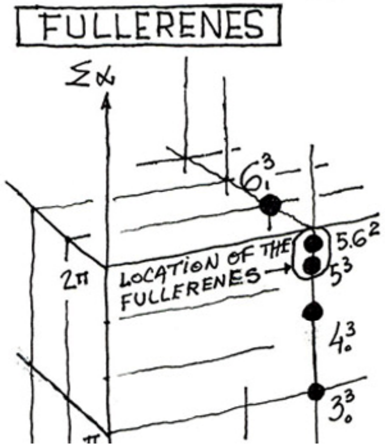
The closed cage structure for C_{70} first proposed by Zhang, O'Brien, Heath, Liu, Curl, Kroto, and Smalley.





These electron micrographs obtained by Iijima clearly show the concentric nature of the carbon nanotubes. The family resemblence to the higher fullerenes is clearly seen in the schematic structure, which shows the hemispherical end caps (each containing six pentagons) and the helical arrangement of hexagons along the tube's length. Micrographs reproduced with permission from Iijima, Sumio (1991). *Nature*, **354**, 56. Copyright (1991) Macmillan Magazines Limited.

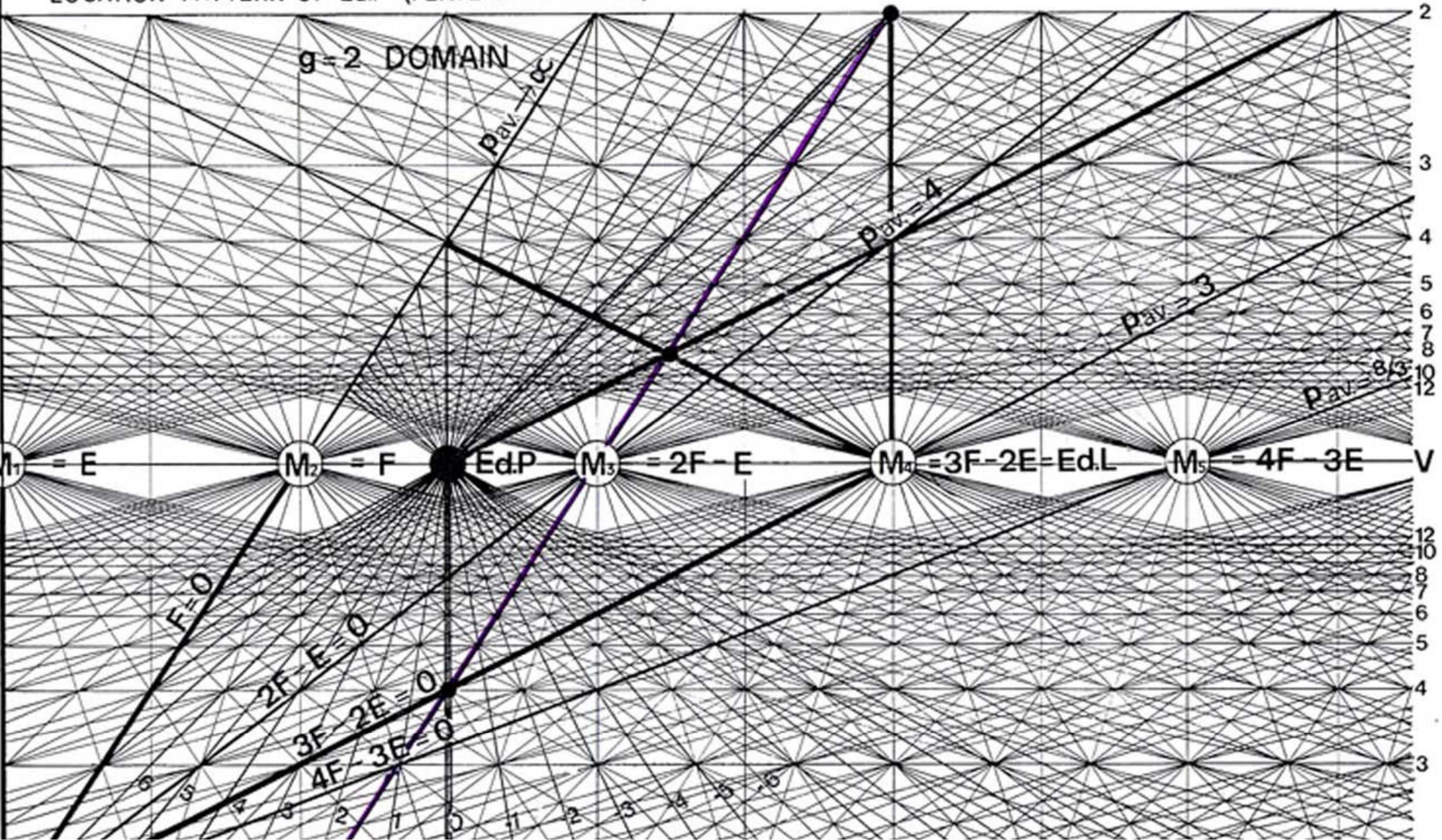


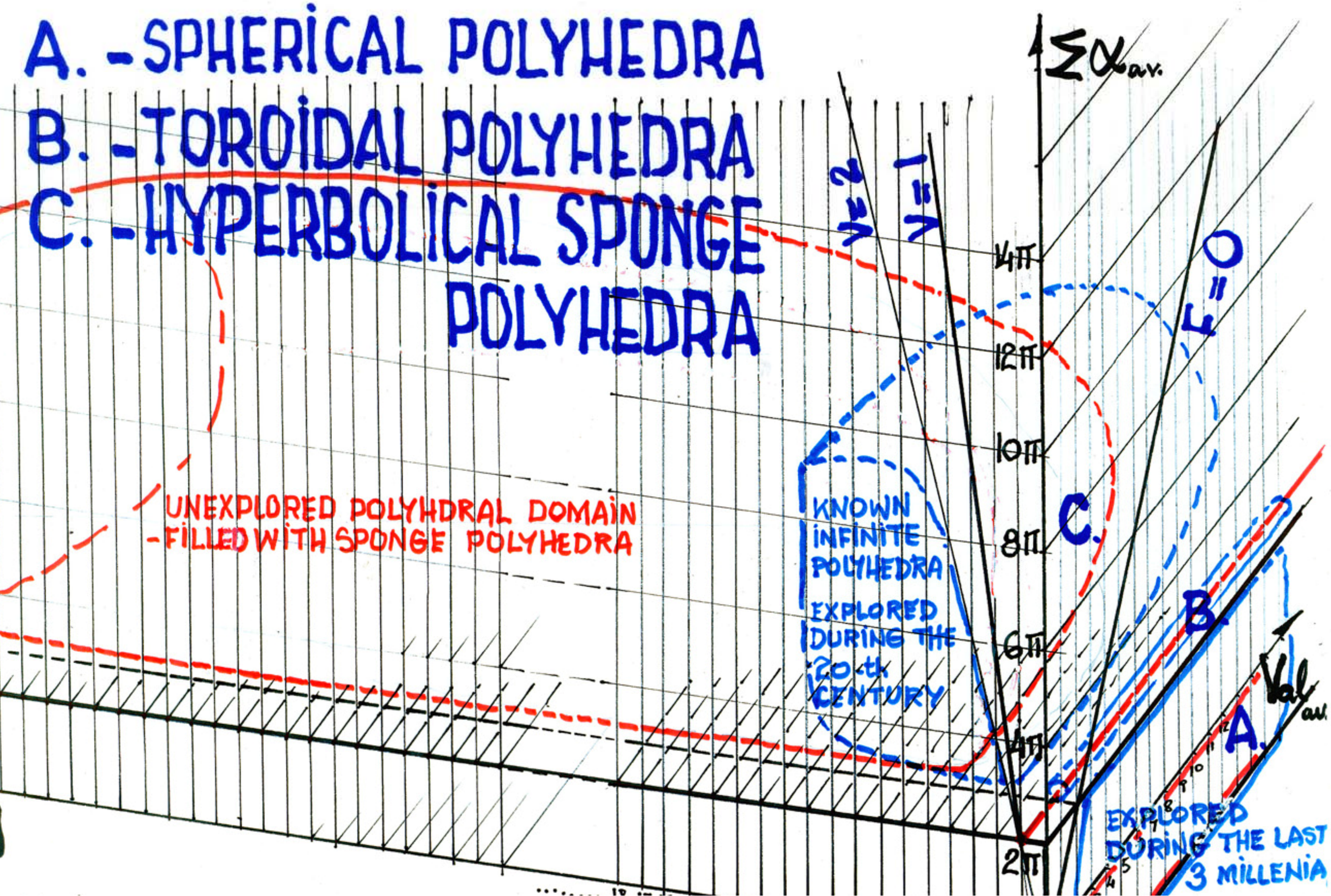


ALL THE LOCATION PATTERNS THROUGH OUT THE CARTESIAN SPACE OF THE TABLE'S STRUCTURE DISPLAY PROMINENT PERIODICITY CHARACTERISTICS, THUS SUBSTANTIATING IT'S CLAIM AS 'THE PERIODIC TABLE OF THE POLYHEDRAL UNIVERSE'.

PERIODIC INTERFERENCE PATTERN OF ALL $M_n = (n-1)F - (n-2)E$ PATTERNS, SHAWN FOR
& g=2 DOMAINS. THE M_n PATTERNS (CONVERGING ON Val.=2(n-1); $\Sigma\alpha = 2\Pi$ POINTS) ARE COMPOSED, IN EACH OF THE g–
NS, OF LINES, EACH OF WHICH IS A LOCUS OF ALL POLYHEDRA WHICH DEVIATE FROM $M_n=0$ BY A MUTUALLY SHARED VALUE.

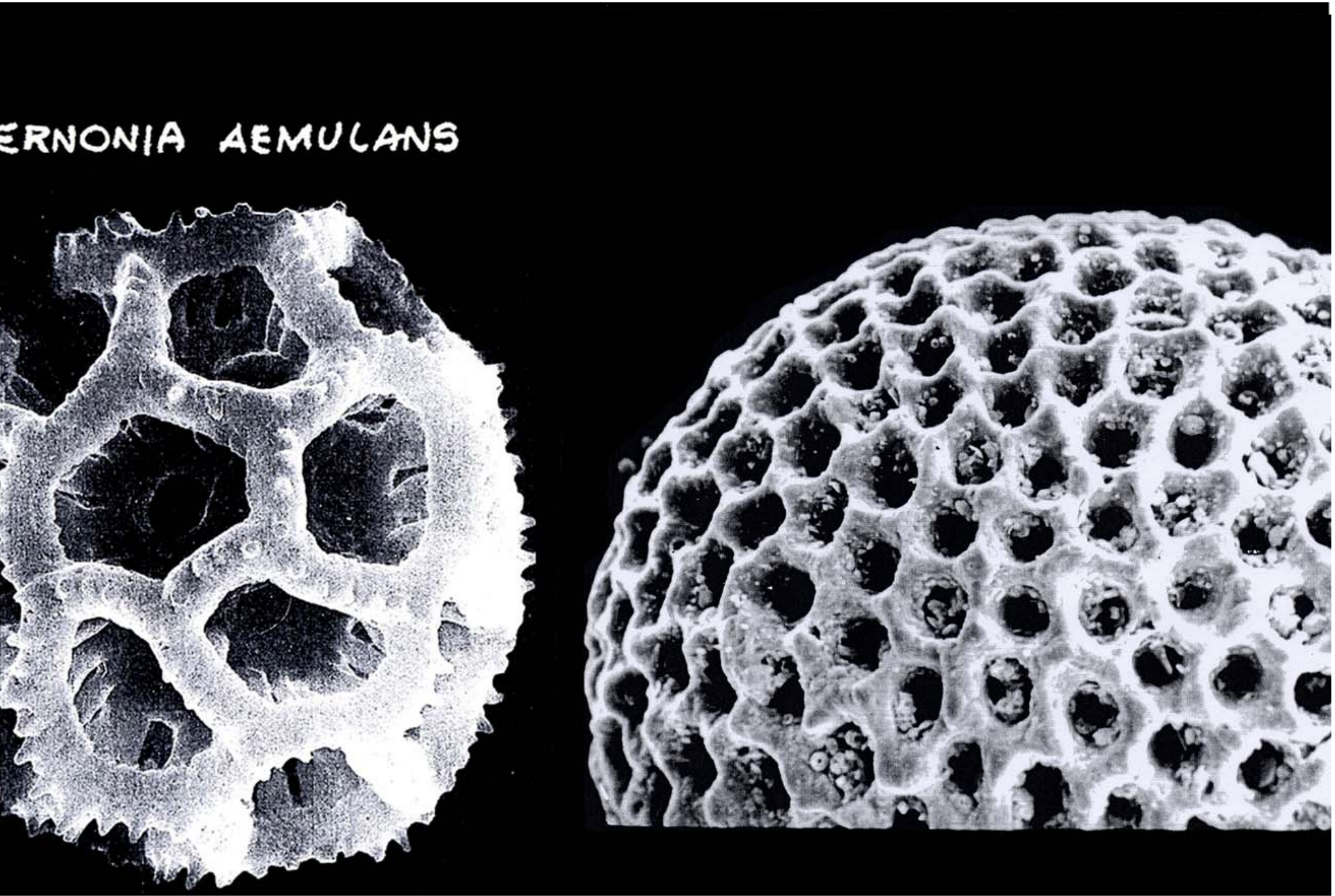
LOCATION PATTERN OF Ed.P (PLATE STRUCTURES)

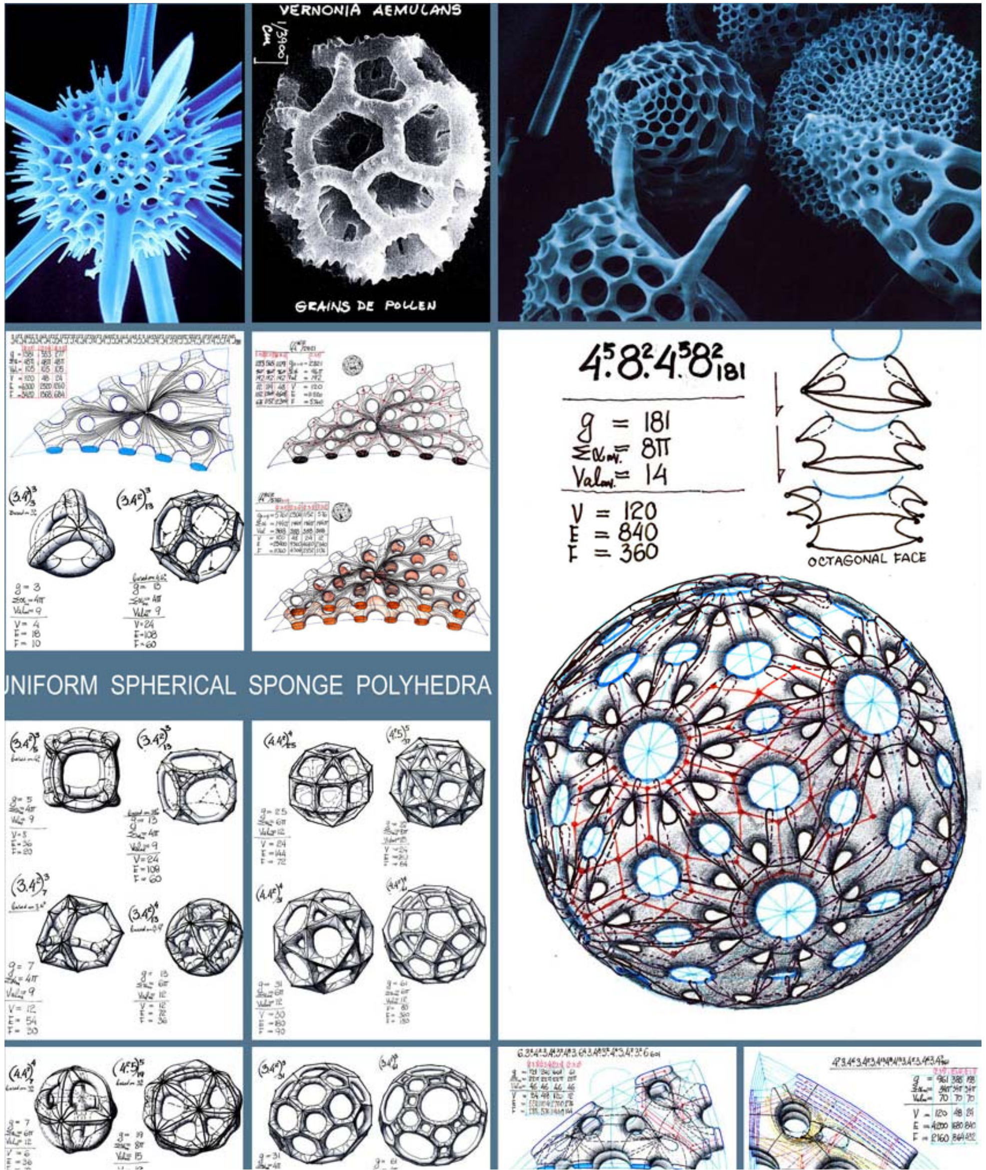



A. -SPHERICAL POLYHEDRA
B. -TOROIDAL POLYHEDRA
C. -HYPERBOLICAL SPONGE POLYHEDRA
UNEXPLORED POLYHDRAL DOMAIN
-FILLED WITH SPONGE POLYHEDRA
KNOWN INFINITE POLYHEDRA
EXPLORED DURING THE 20-th CENTURY
EXPLORED DURING THE LAST 3 MILLENIA
Σα av.
Val av.
14π
12π
10π
8π
6π
4π
2π
C.
B.
A.

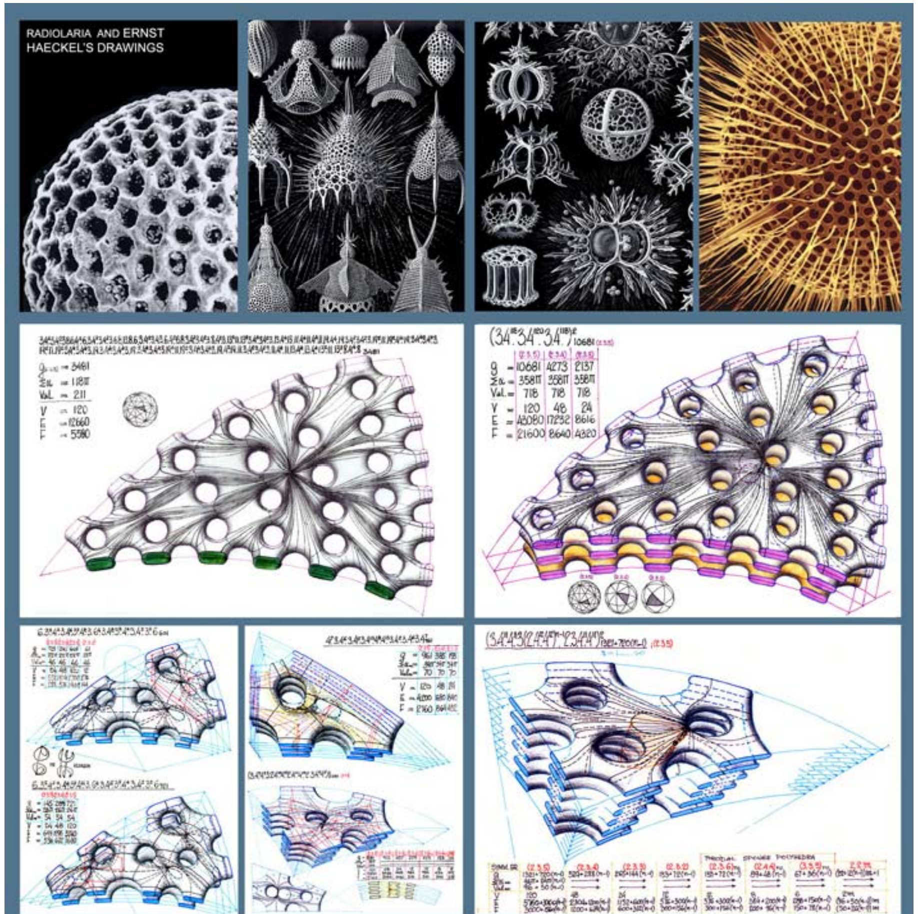
THE EXPANDING BOUNDARIES OF THE 'POLYHEDRAL UNIVERSE'

"How far, in terms of the primary parameter values of val.; Σα and g, the theoretically imaginable uniform polyhedra phenomenon may expand (?)" is a mind provoking question and a worthy intellectual challenge for every 3D space explorer.

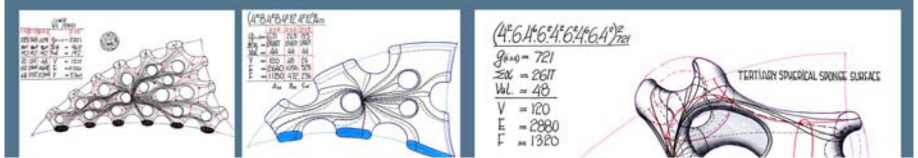

ERNONIA AEMULANS

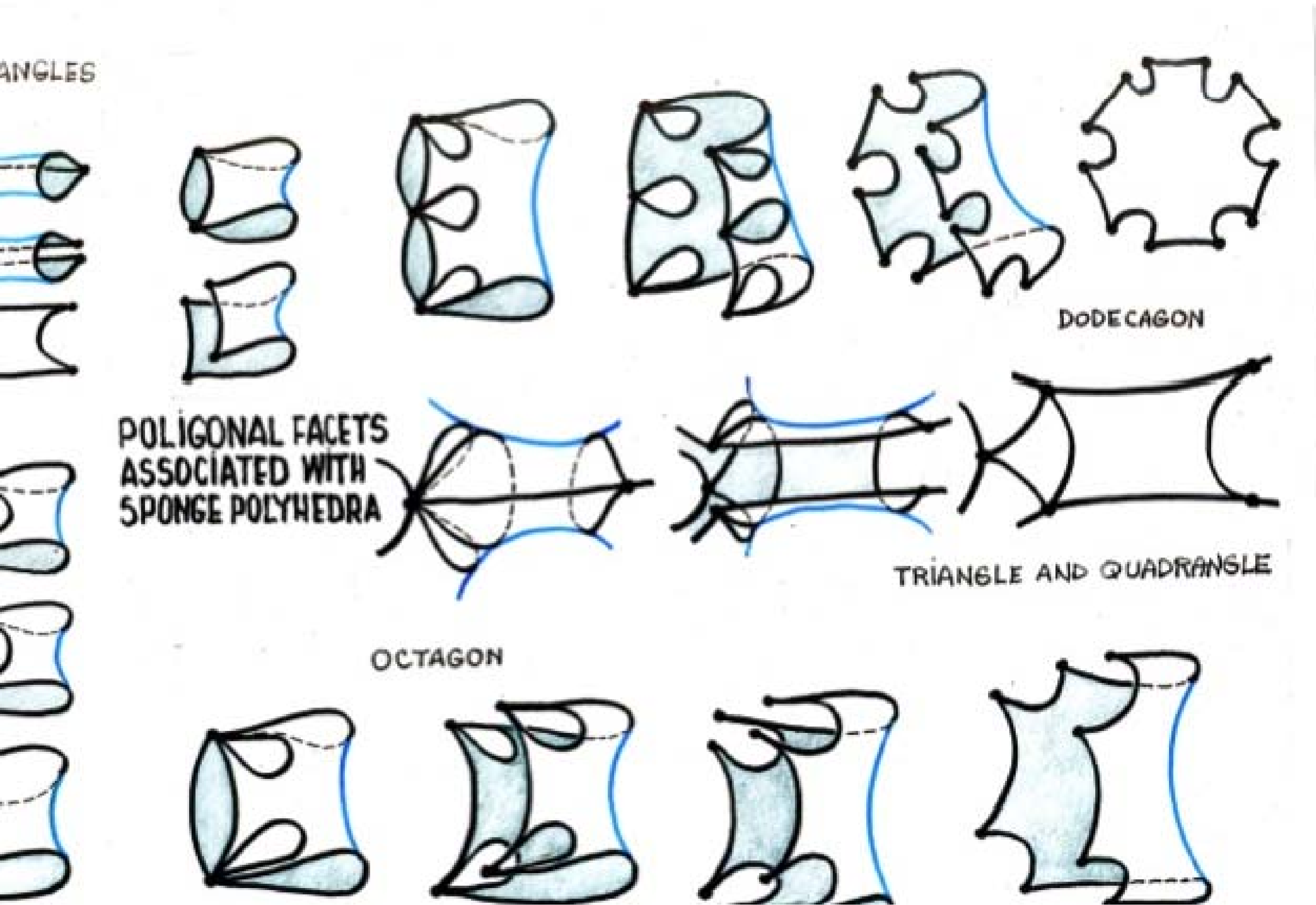


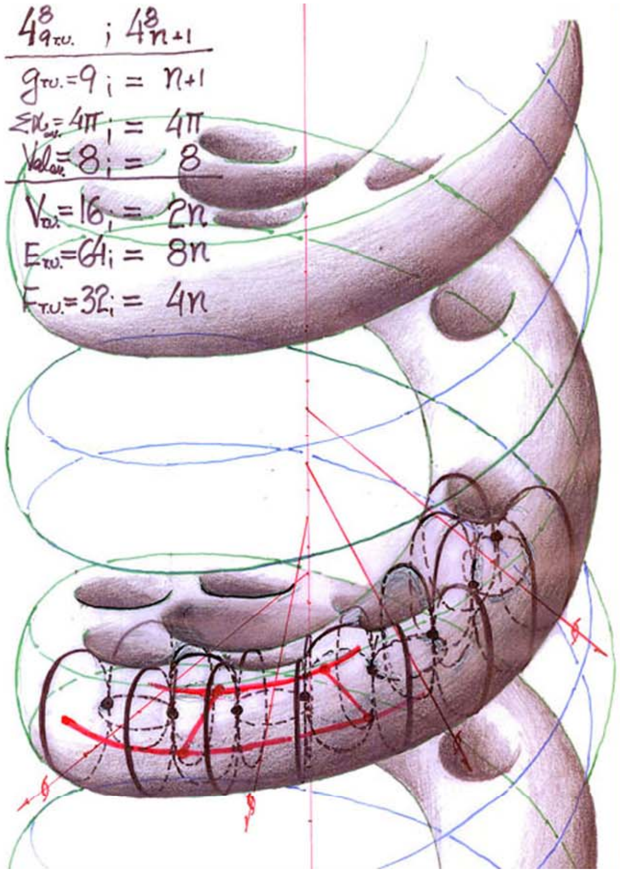
VERNONIA AEMULANS
GRAINS DE POLLEN
UNIFORM SPHERICAL SPONGE POLYHEDRA
4⁵.8².4⁵.8² 181
g = 181
Val. = 14
V = 120
E = 840
F = 360
OCTAGONAL FACE

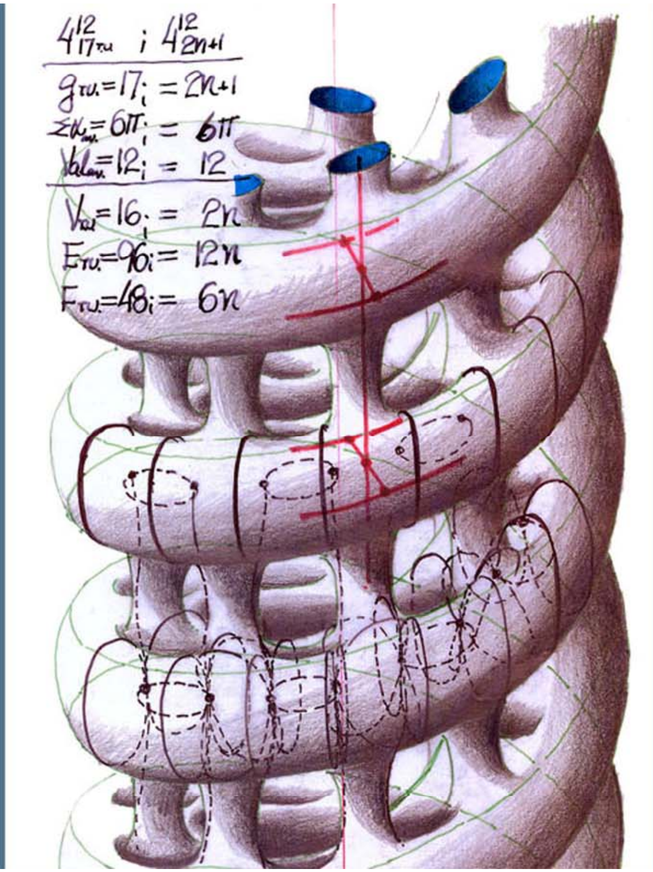


SINGLE AND MULTI LAYERED, UNIFORM, SPHERICAL SPONGE POLYHEDRA MICHAEL BURT, 2008



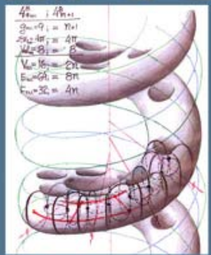

ANGLES
DODECAGON
POLIGONAL FACETS
ASSOCIATED WITH
SPONGE POLYHEDRA
TRIANGLE AND QUADRANGLE
OCTAGON

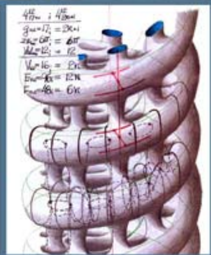

gTU.=9 ; = n+1
ΣW=4π ; = 4π
Valen.=8 ; = 8
VTU.=16 ; = 2n
ETU.=64 ; = 8n
FTU.=32 ; = 4n

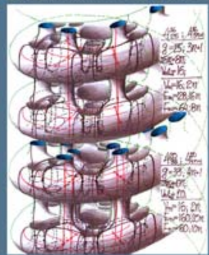

gTU.=17 ; = 2n+1
ΣW=6π ; = 6π
Valen.=12 ; = 12
VTU.=16 ; = 2n
ETU.=96 ; = 12n
FTU.=48 ; = 6n

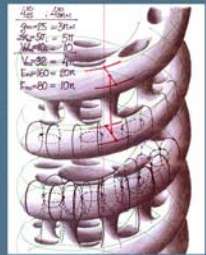
PONT DU GARD

PARK GUEL - GAUDI

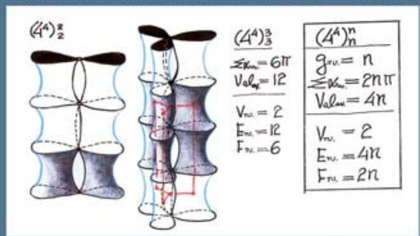


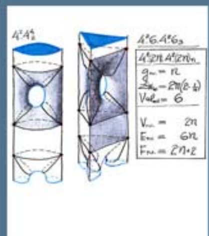


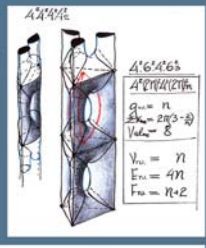




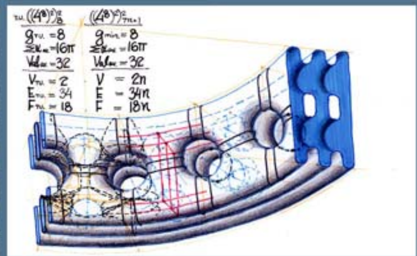
PRIMITIVE UNIFORM SPONGE POLYHEDRA M.BURT

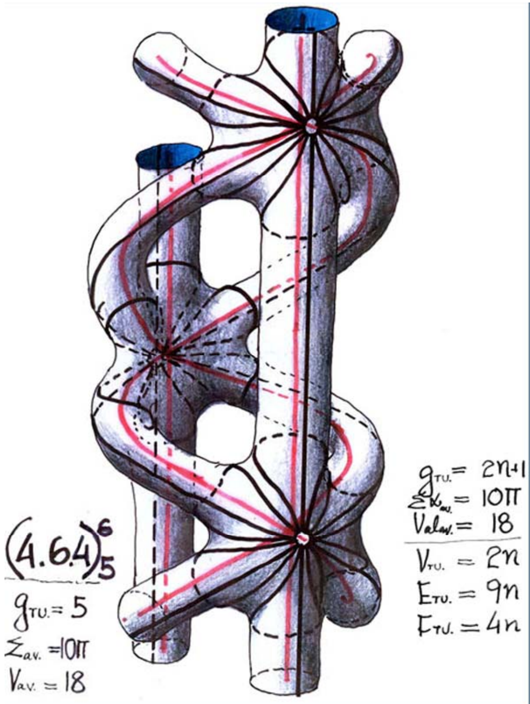


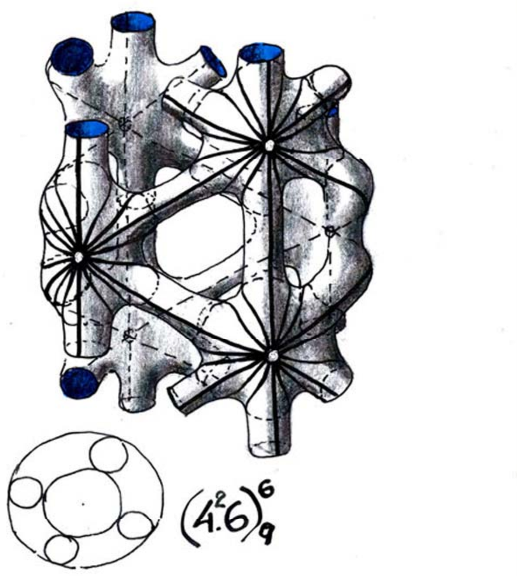




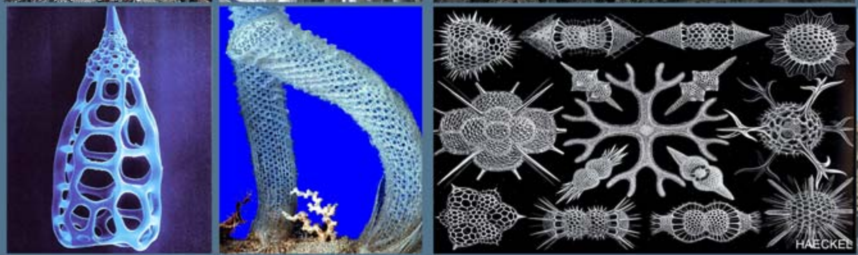
CASA MILLA - GAUDI



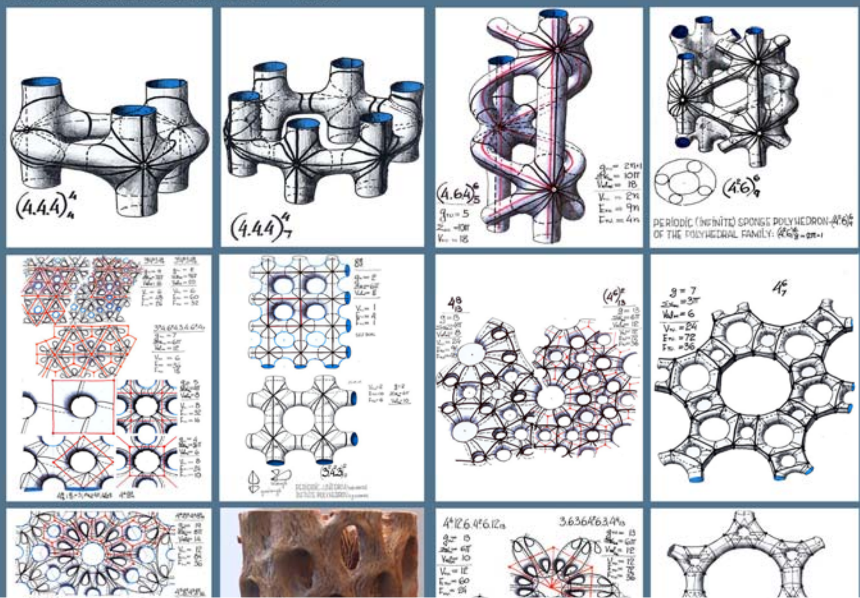




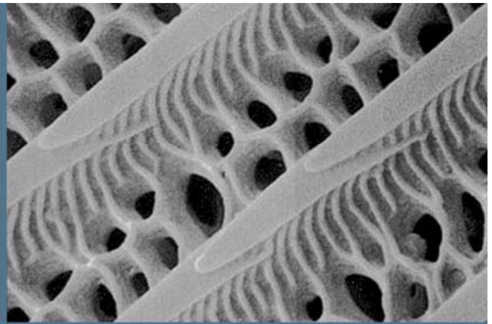
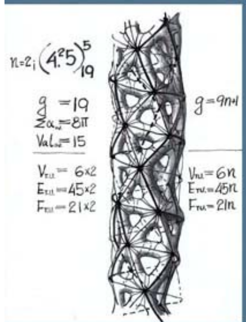
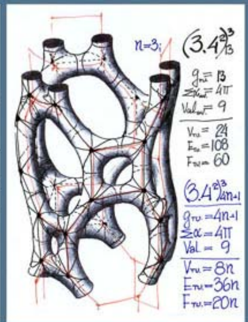
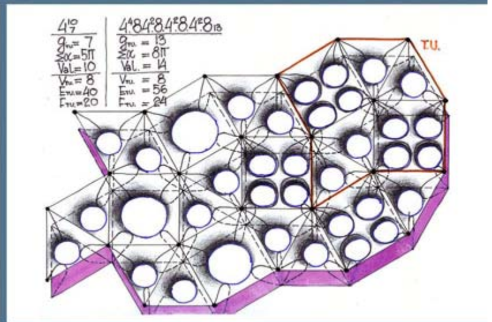
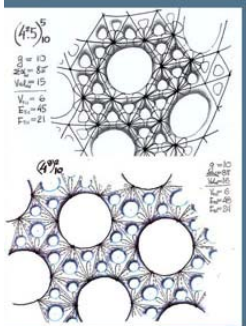
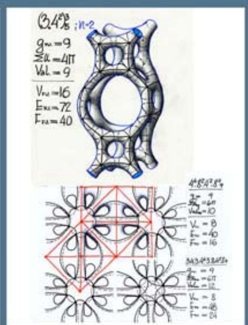
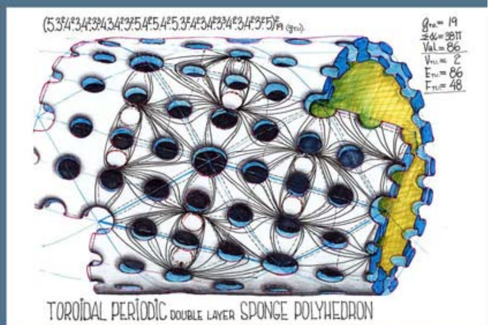
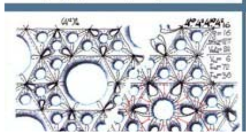
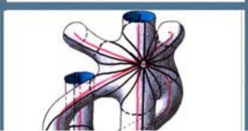
PERIODIC (INFINITE) SPONGE POLYHEDRON – $(4^2.6)^6_9$
OF THE POLYHEDRAL FAMILY: $(4^2.6)^6_{g=2\pi+1}$

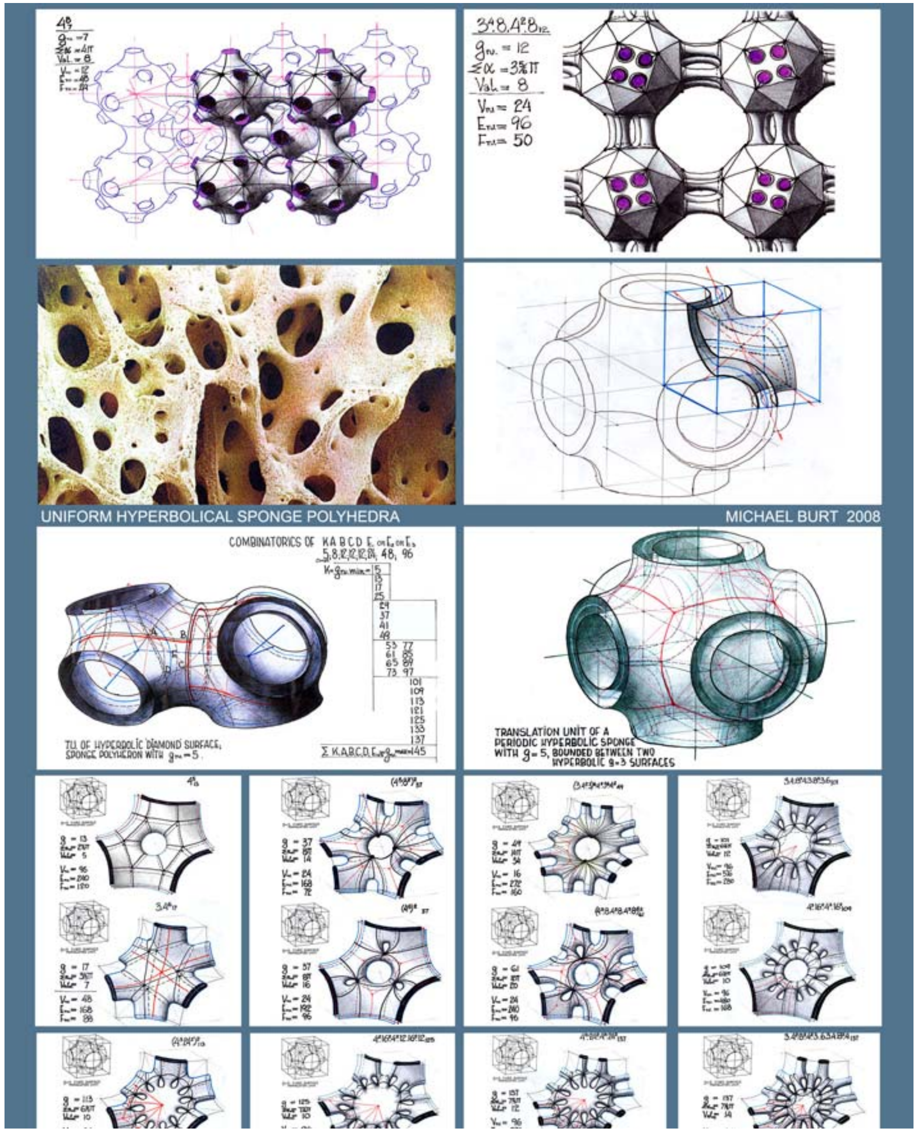


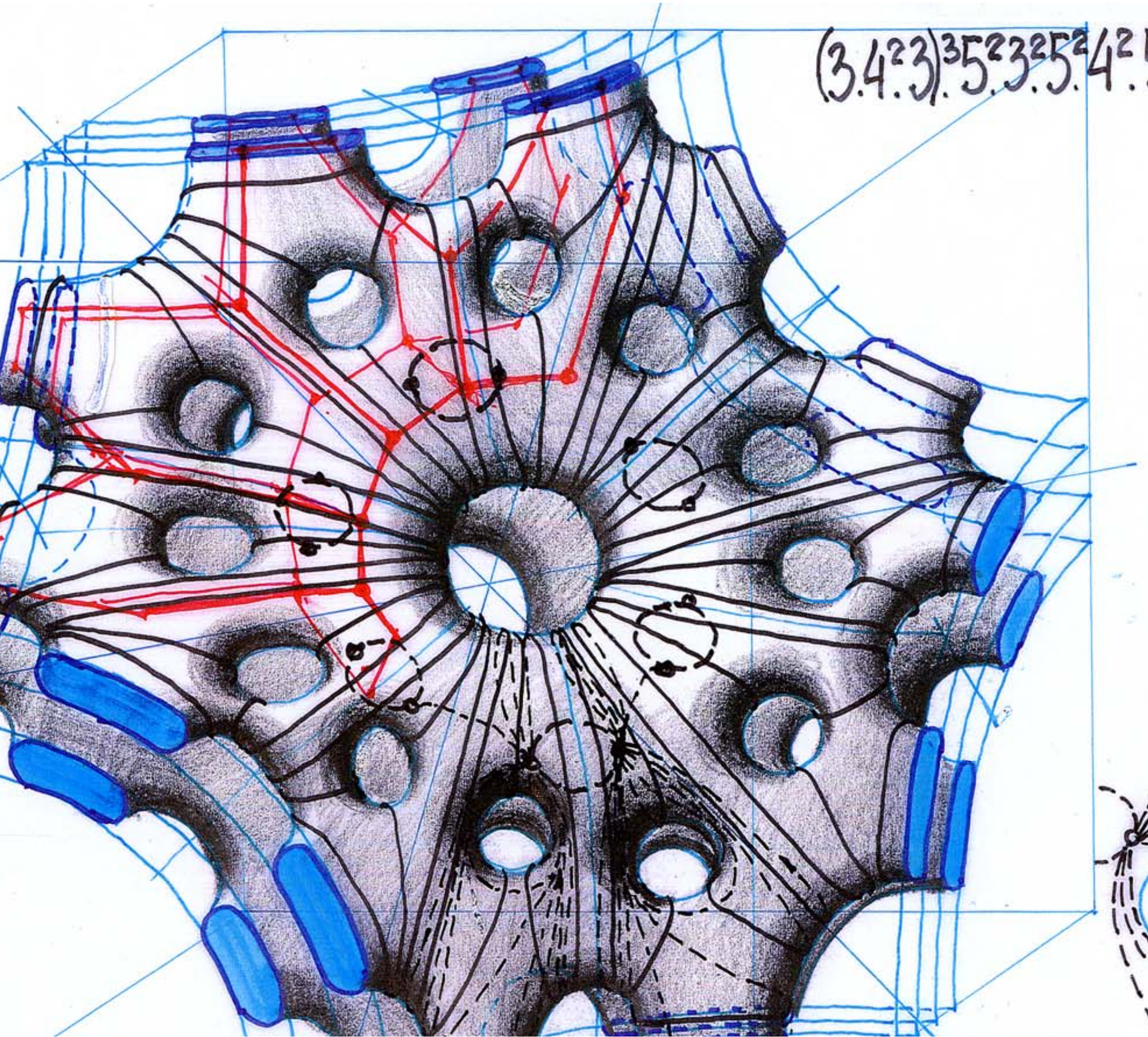
UNIFORM TOROIDAL SPONGE POLYHEDRA M.BURT







g = 19
g = 9n+1


T.U.



TOROIDAL PERIODIC DOUBLE LAYER SPONGE POLYHEDRON





UNIFORM HYPERBOLICAL SPONGE POLYHEDRA
MICHAEL BURT 2008
TRANSLATION UNIT OF A
PERIODIC HYPERBOLIC SPONGE
WITH g = 5, BOUNDED BETWEEN TWO
HYPERBOLIC g = 3 SURFACES



$$(3.4^2.3)^3.5^2.3^2.5^2.4^2.5.3.4^2.3.5.4^2.5^2.3^2.5^2_{337}$$

$$g_{TU.} = 337$$

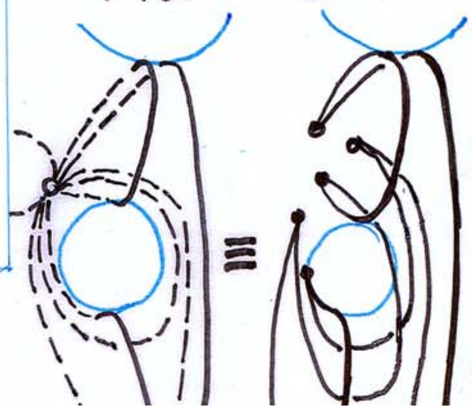
$$\sum \alpha_{av.} = 16\pi$$

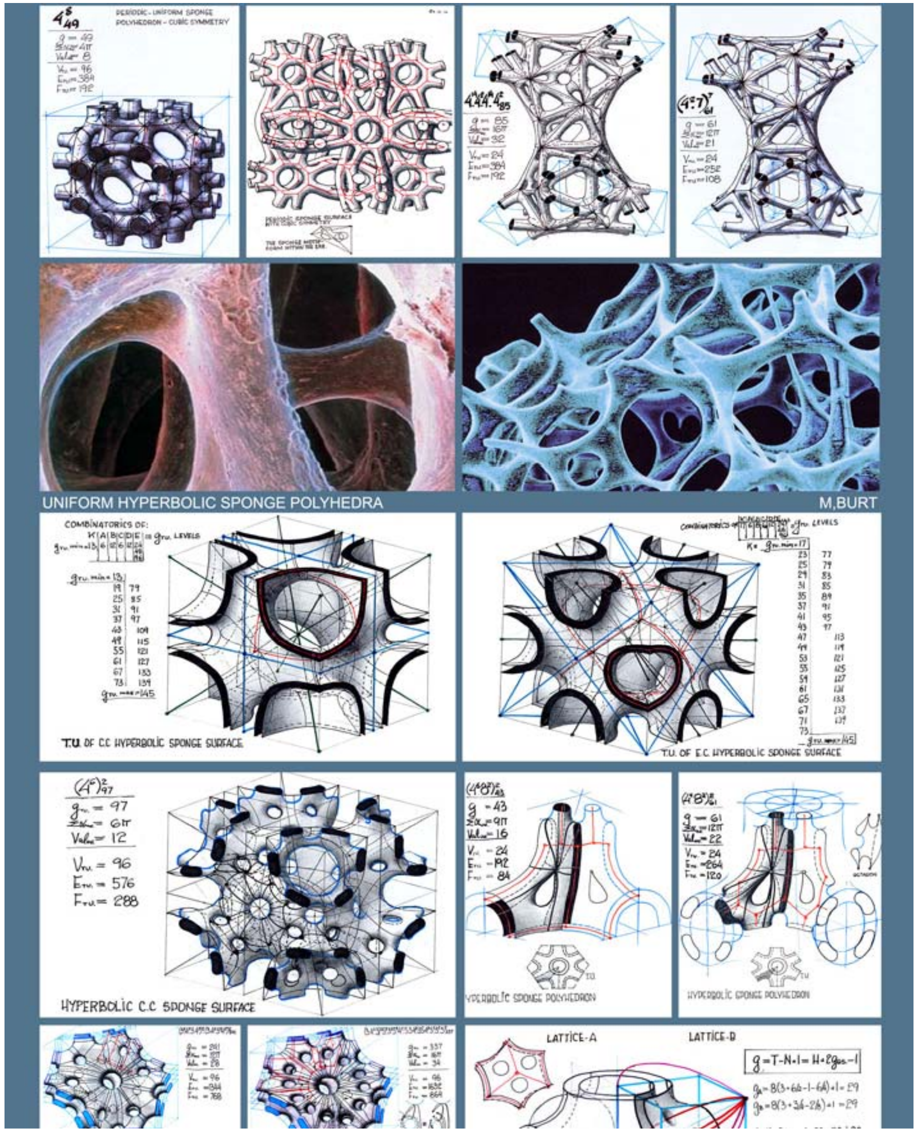
$$Val_{av.} = 34$$

$$V_{TU.} = 96$$

$$E_{TU.} = 1632$$

$$F_{TU.} = 864$$





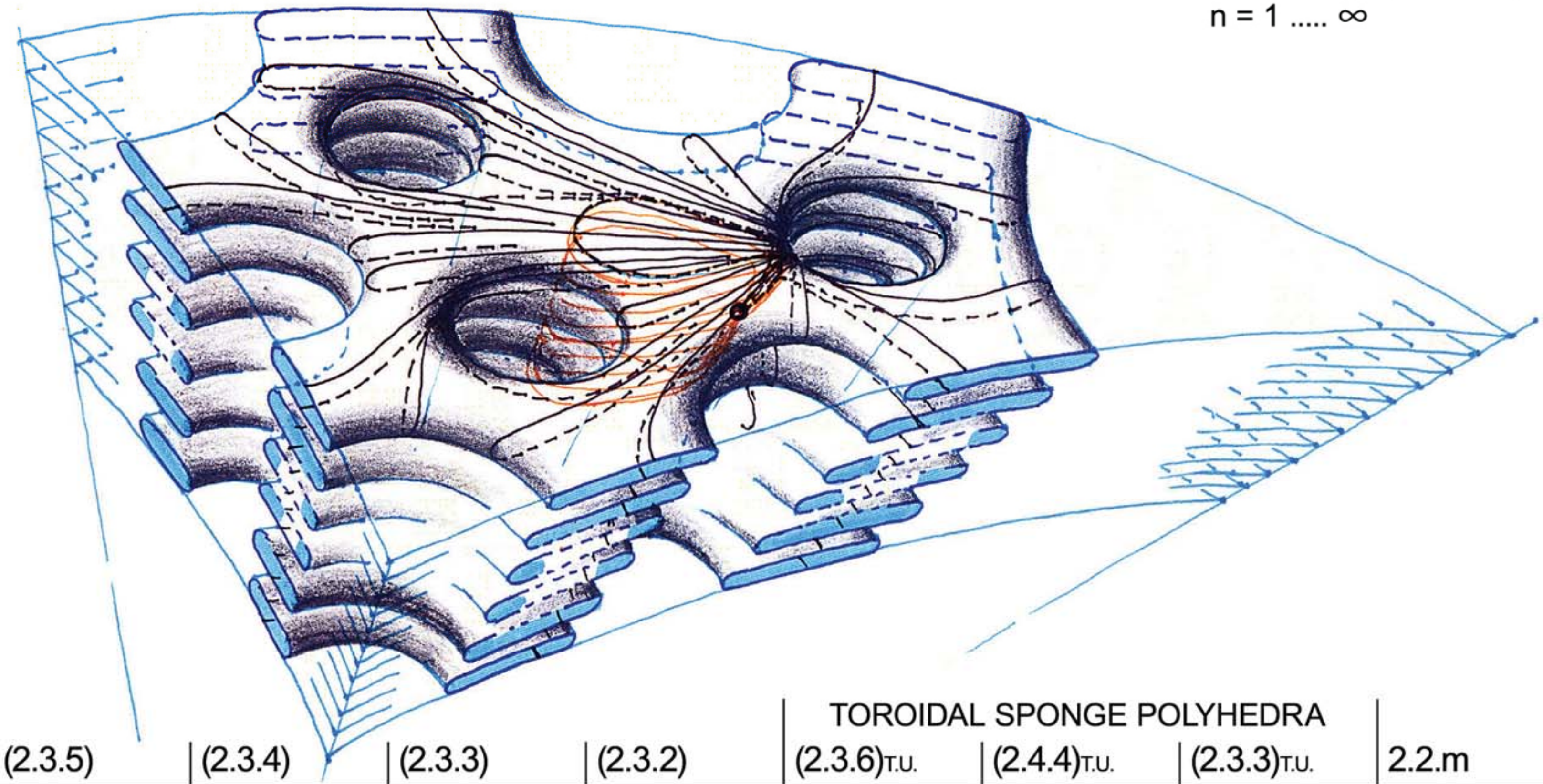
PERIODIC-UNIFORM SPONGE
POLYHEDRON - CUBIC SYMMETRY
UNIFORM HYPERBOLIC SPONGE POLYHEDRA
M,BURT
T.U. OF C.C HYPERBOLIC SPONGE SURFACE
T.U. OF E.C. HYPERBOLIC SPONGE SURFACE
HYPERBOLIC C.C SPONGE SURFACE
HYPERBOLIC SPONGE POLYHEDRON
LATTICE-A
LATTICE-B

It transpires that hyperbolical sponge surfaces and their related (polyhedral) tessellations are not just the most abundant forms in nature but, also, are overwhelmingly the most abundant and most dominant features of the 'theoretically imaginable' configurations within the Periodic Table's space of the polyhedral universe.

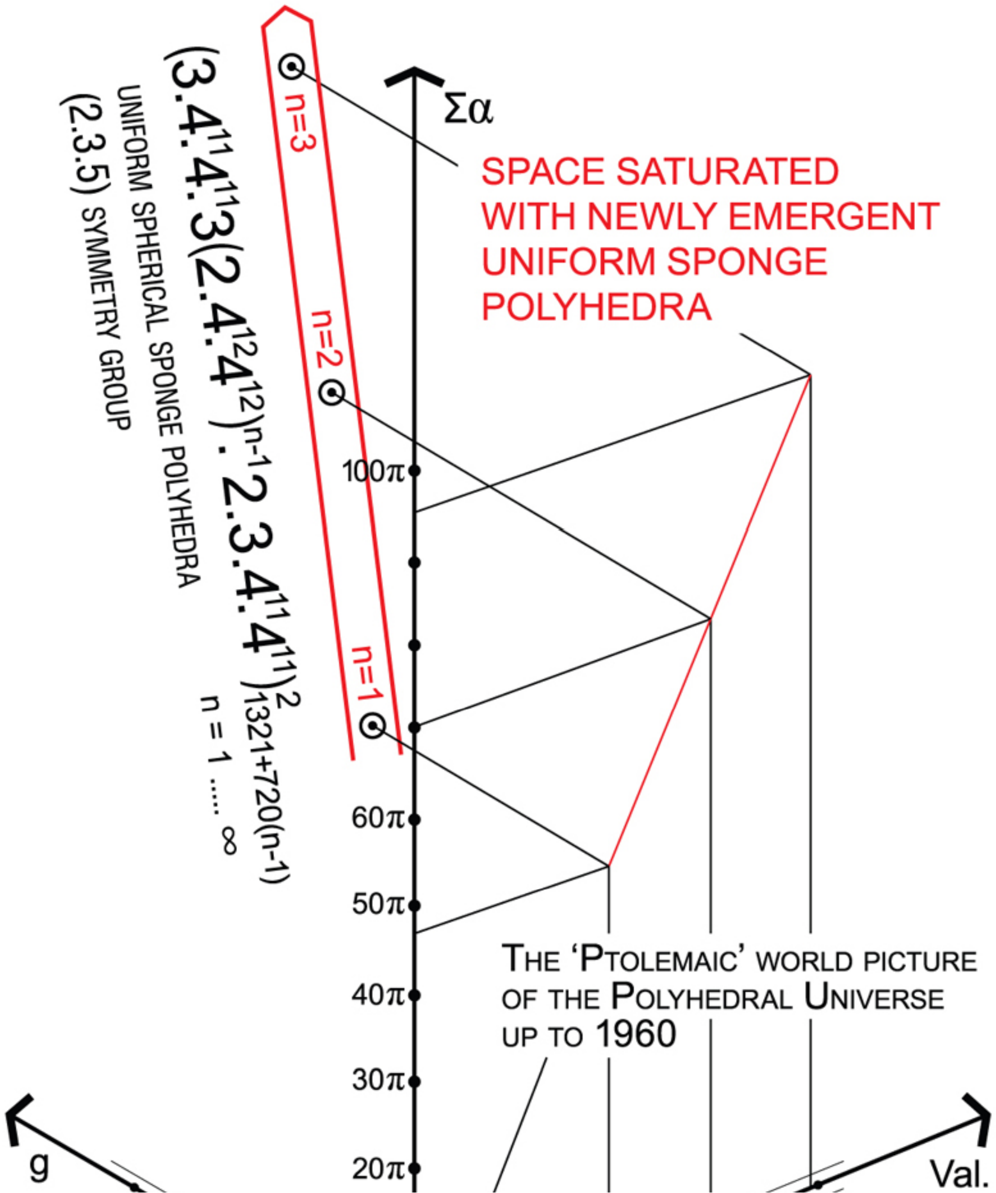
The millennia long accumulated heritage of uniform plane faceted polyhedral shapes, partitions and solids account just for a tiny fraction of the 'theoretically imaginable' universe, even within the g = 0 (spherical – finite) domain and the g = 1 (toroidal) domain.

$$(3.4^{11}.4^{11}.3(2.4^{12}.4^{12})^{n-1}.2.3.4^{11}.4^{11})^{2}_{1321+720(n-1)} \quad ;(2.3.5)$$

$$n = 1 \ldots\ldots \infty$$



				TOROIDAL SPONGE POLYHEDRA			
(2.3.5)	(2.3.4)	(2.3.3)	(2.3.2)	(2.3.6)T.U.	(2.4.4)T.U.	(2.3.3)T.U.	2.2.m
1321+720(n-1)	529+288(n-1)	265+144(n-1)	133+72(n-1)	133+72(n-1)	89+48(n-1)	67+36(n-1)	(22+12(n-1))m+1
$46\pi+24\pi(n-1)$	→	→	→	→	→	→	→
96+50(n-1)	→	→	→	→	→	→	→
120	48	24	12	12	8	6	2m

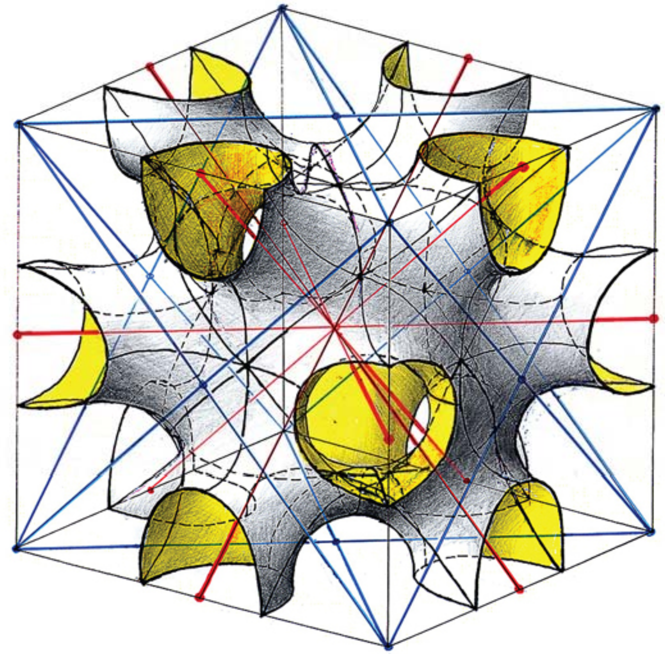


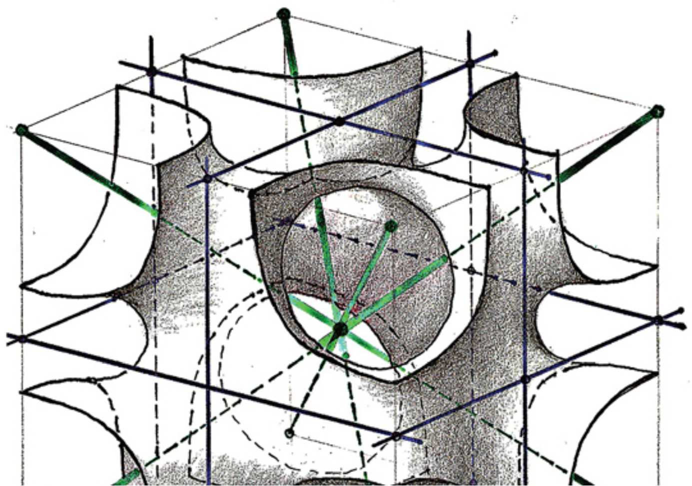
$(3.4^{11}.4^{11}3(2.4^{12}4^{12})^{n-1}.2.3.4^{11}4^{11})^{2}_{1321+720(n-1)}$
n = 1 .... ∞
UNIFORM SPHERICAL SPONGE POLYHEDRA
(2.3.5) SYMMETRY GROUP
n=3
n=2
n=1
Σα
SPACE SATURATED WITH NEWLY EMERGENT UNIFORM SPONGE POLYHEDRA
100π
60π
50π
40π
30π
20π
THE 'PTOLEMAIC' WORLD PICTURE OF THE POLYHEDRAL UNIVERSE UP TO 1960
g
Val.

The second category of structures, populating 3D space, describes **polytopal interrelating and interconnected arrays of** (sometimes) energized **point-wise entities which could be represented as diagrams with a network or space lattice characteristics.**

Diagrams of this kind may represent the structure of almost any abstract or physical plurality that may exist, in the world of phenomena of the biological-physical-material domain, on every possible scale, from the nano-molecular

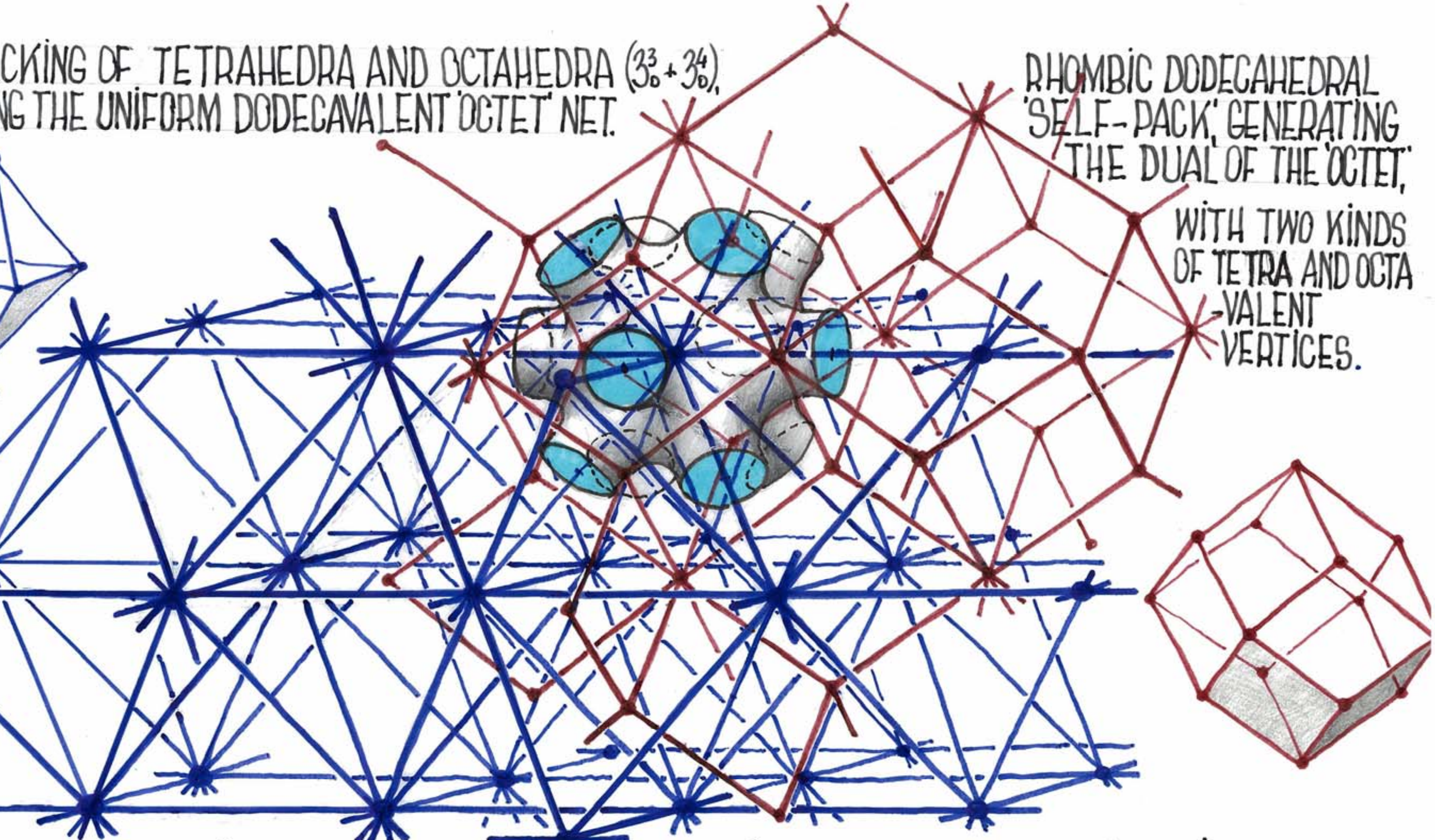
In his monumental publication on ‘Structural inorganic chemistry’ **A.F. Wells** makes a startling observation: “**The theory of these nets does not appear to be known, and in fact no attempt to derive them systematically seems to have been made** until comparatively recently”.



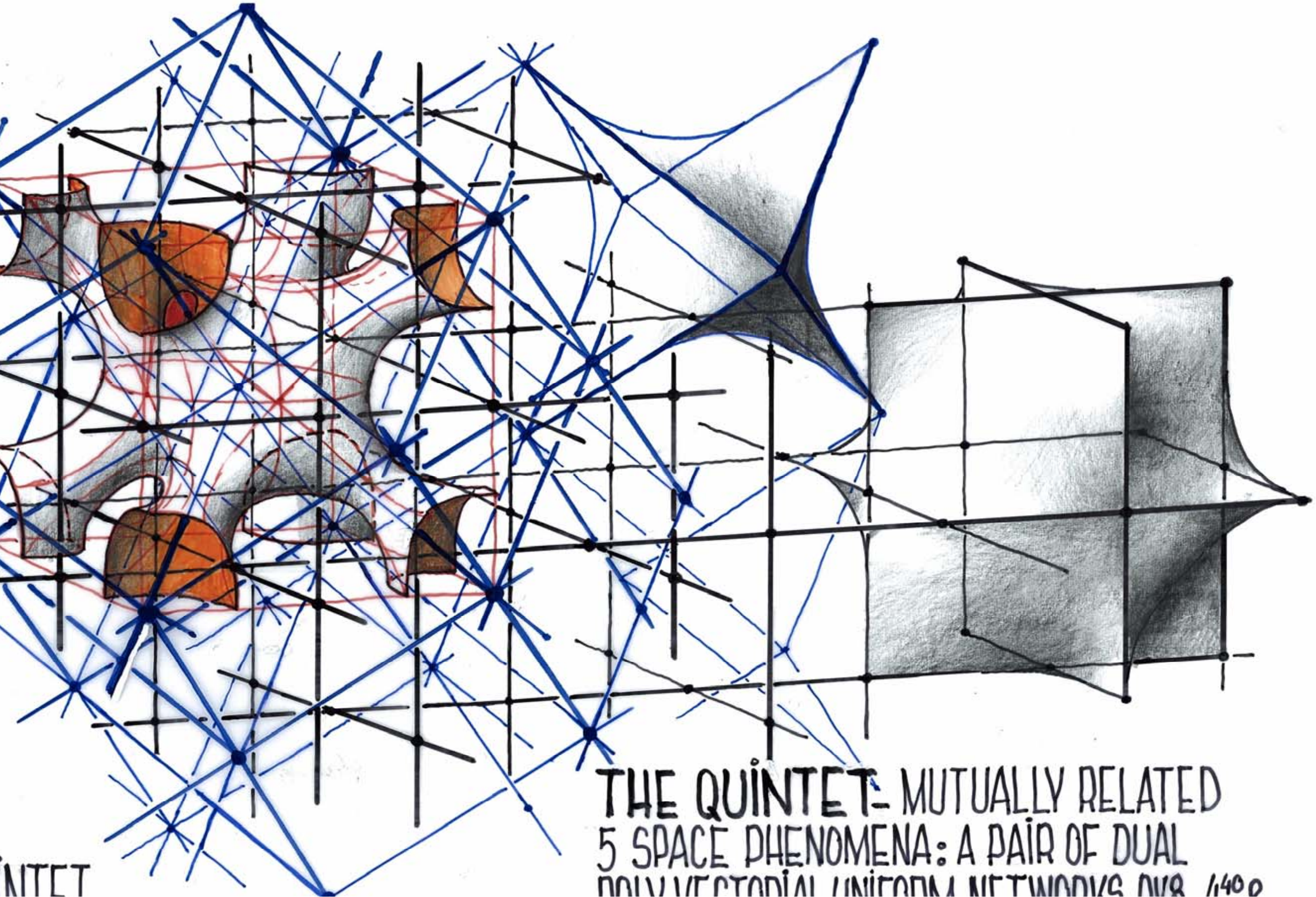


THE 'QUINTUPLE' PHENOMENON OF 3-D SPACE

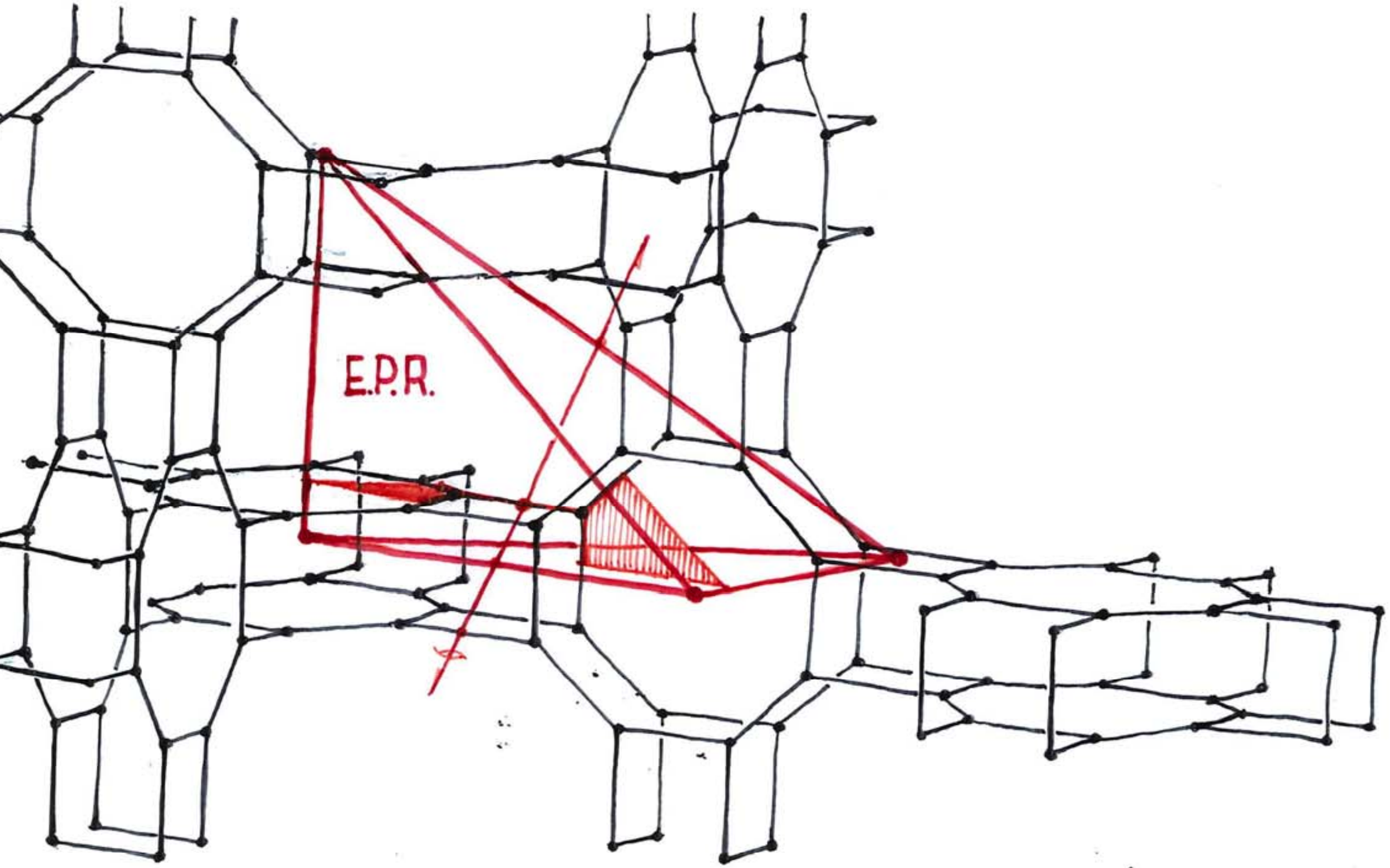
The **'quintuple'** of the **dual networks pair,** the **two related close space packings** and **the associated reciprocal sponge surface** is the most conspicuous, all pervading geometric-topological phenomenon of our 3D space, associated with its order and organization, and more than anything else, determines the way we



ETWORKS PAIR, THEIR RELATED CLOSE-PACKING MODES AND THE ASSOCIATED
OLICAL PARTITION SURFACE, SUBDIVIDING THE SPACE BETWEEN THE TWO.



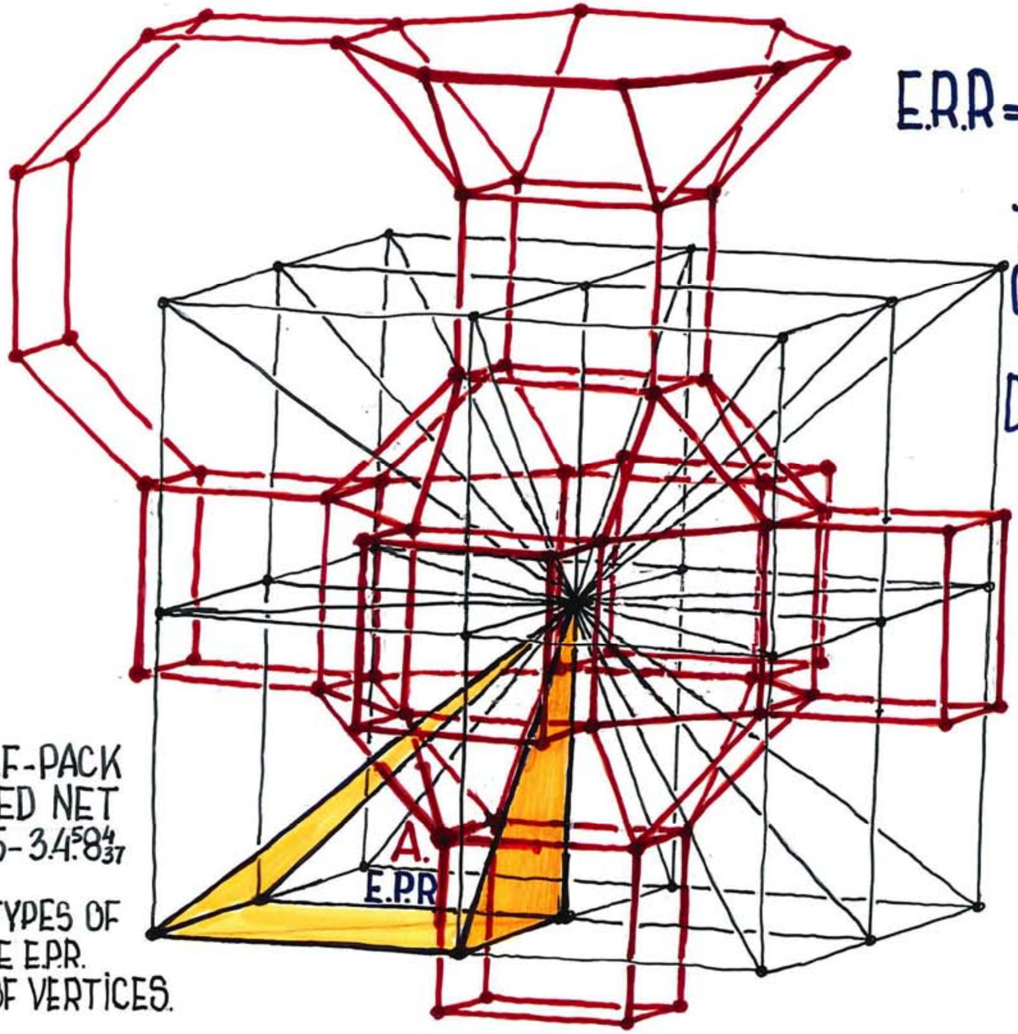
THE QUINTET- MUTUALLY RELATED
5 SPACE PHENOMENA: A PAIR OF DUAL



96 VERTICES PER ONE E.P.R

$\text{Den.}_{PV-3-8^3 \cdot 12^2_{49}} = 0.452272785\, a/a^3$

/B.



E.R.R = 1/24 OF THE CUBE'S VOLUME.

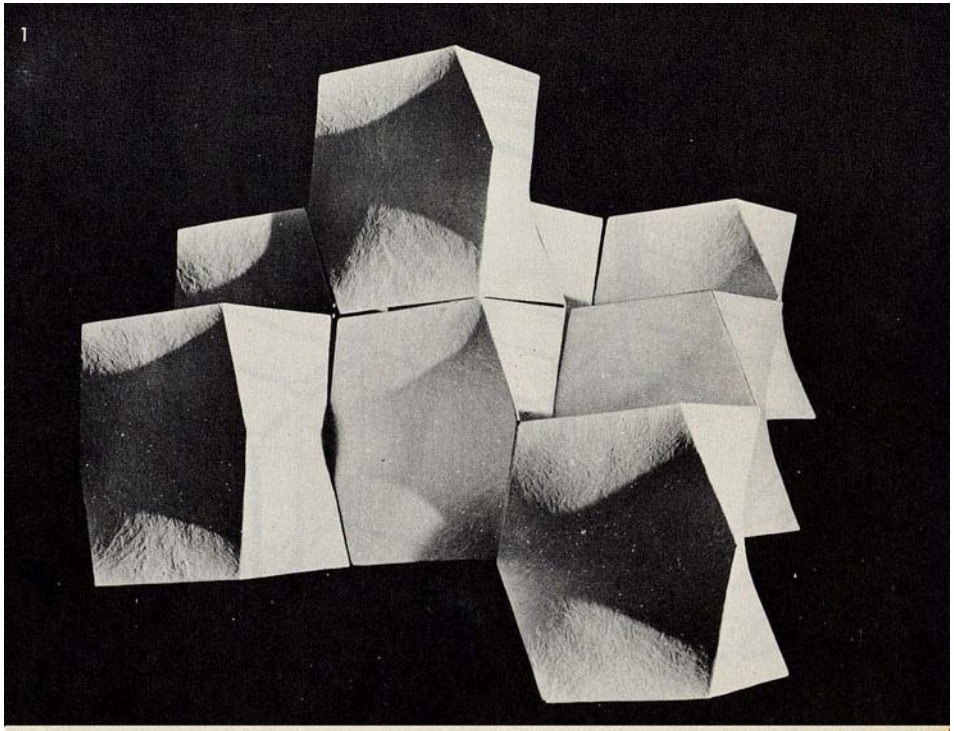
THE NETWORK DESCRIBES CLOSE PACKING OF 4^3_o; 3.4^3_o; $4^2.8_o$

Den. PV.-5-$3.4^5.8^4_{37}$ = 1.50757595 la/a^3

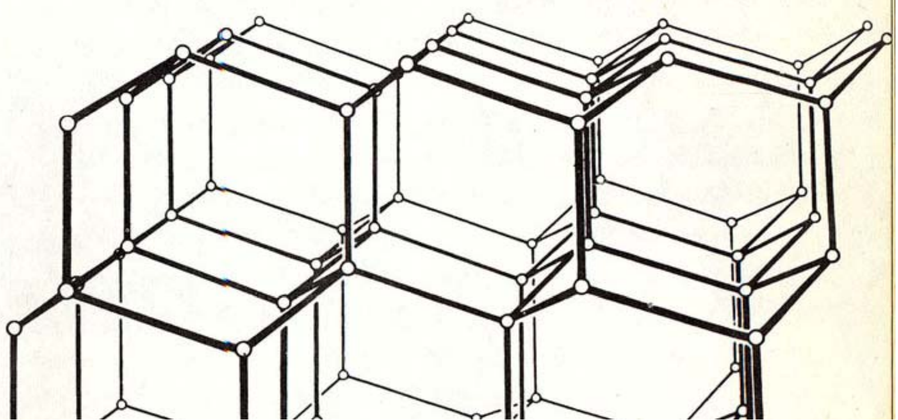
IS A SELF-PACK
GENERATED NET
L OF PV.-5-$3.4^5.8^4_{37}$

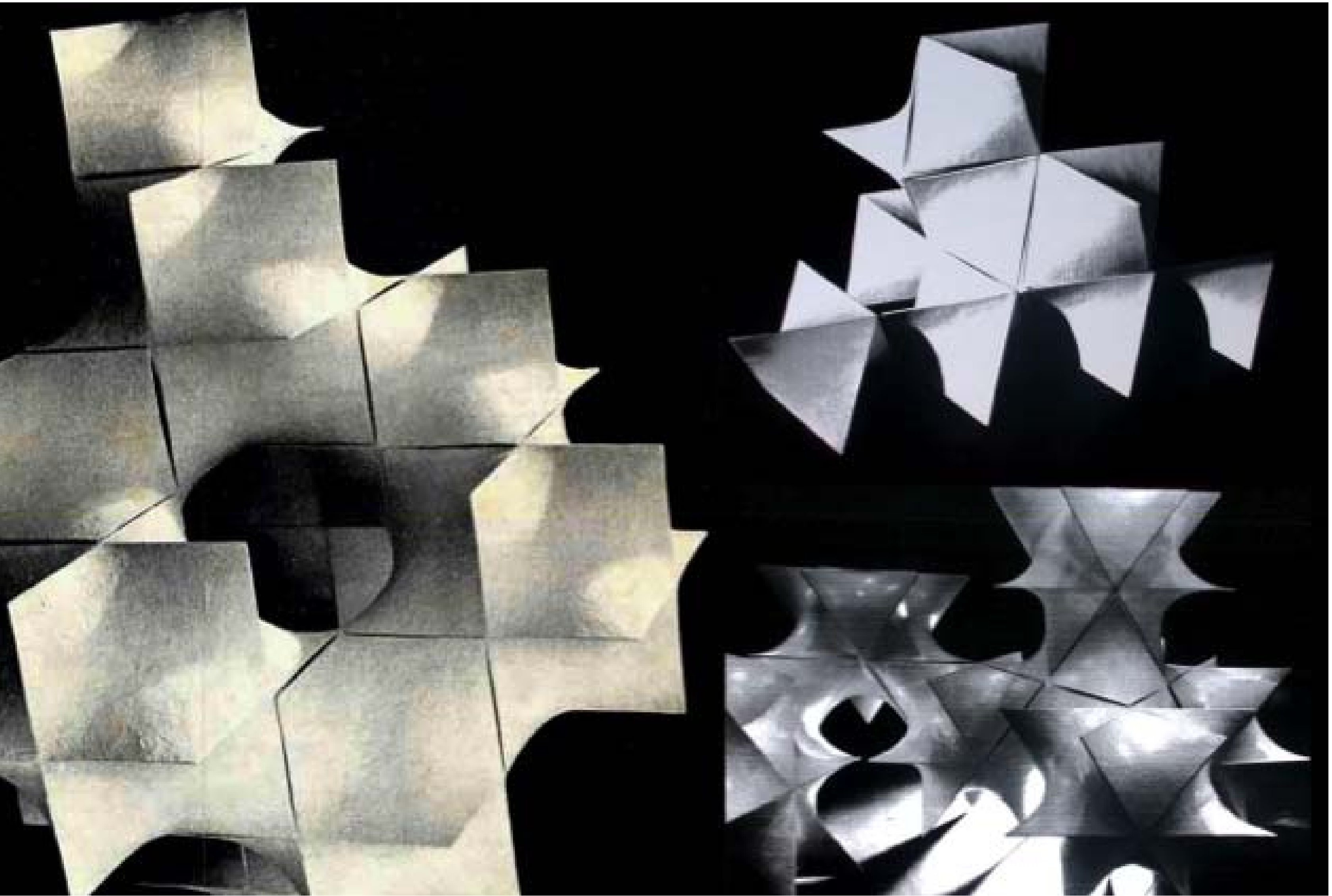
7 HAS 3 TYPES OF
OLIDS; THE E.P.R.
3 TYPES OF VERTICES.

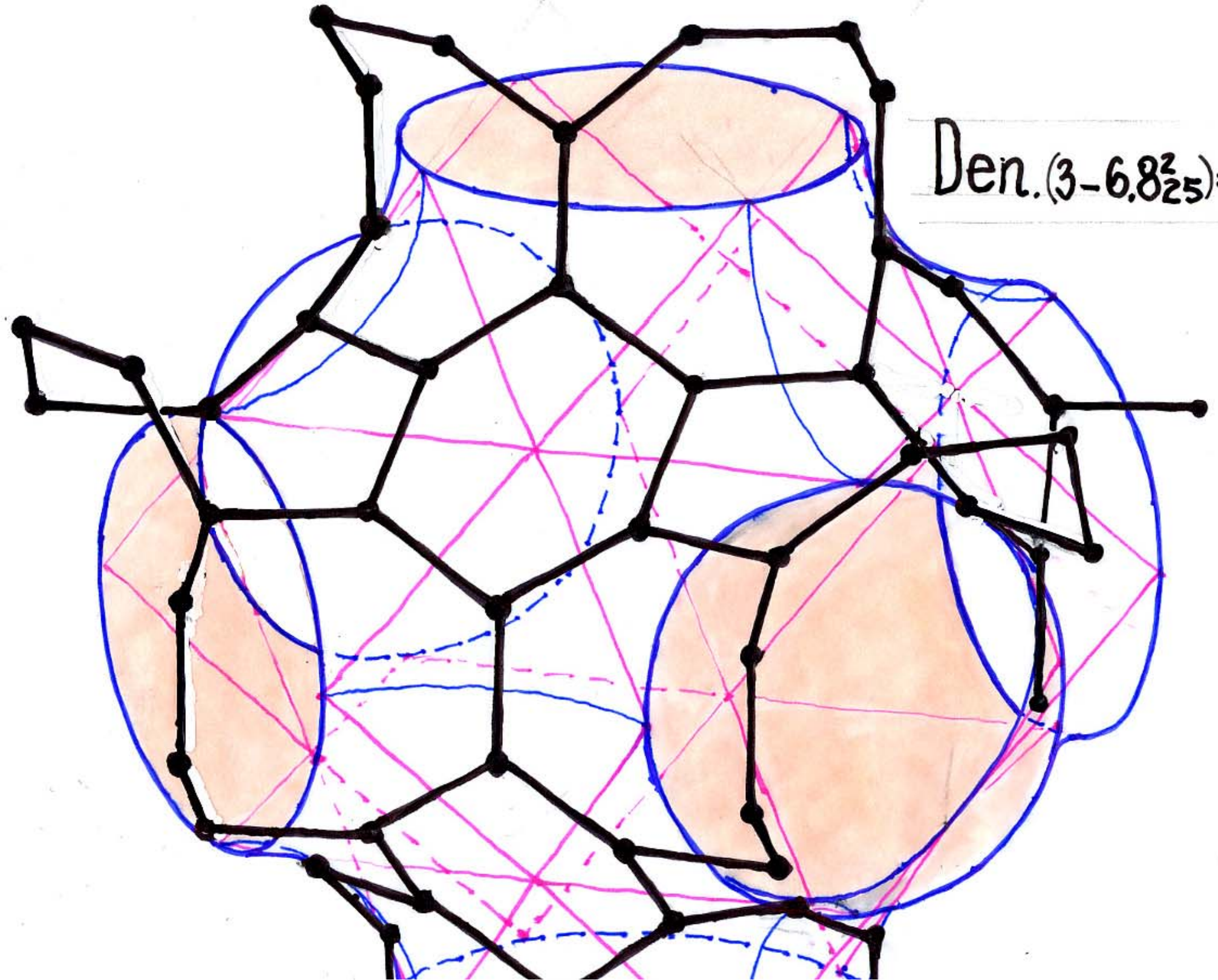
1



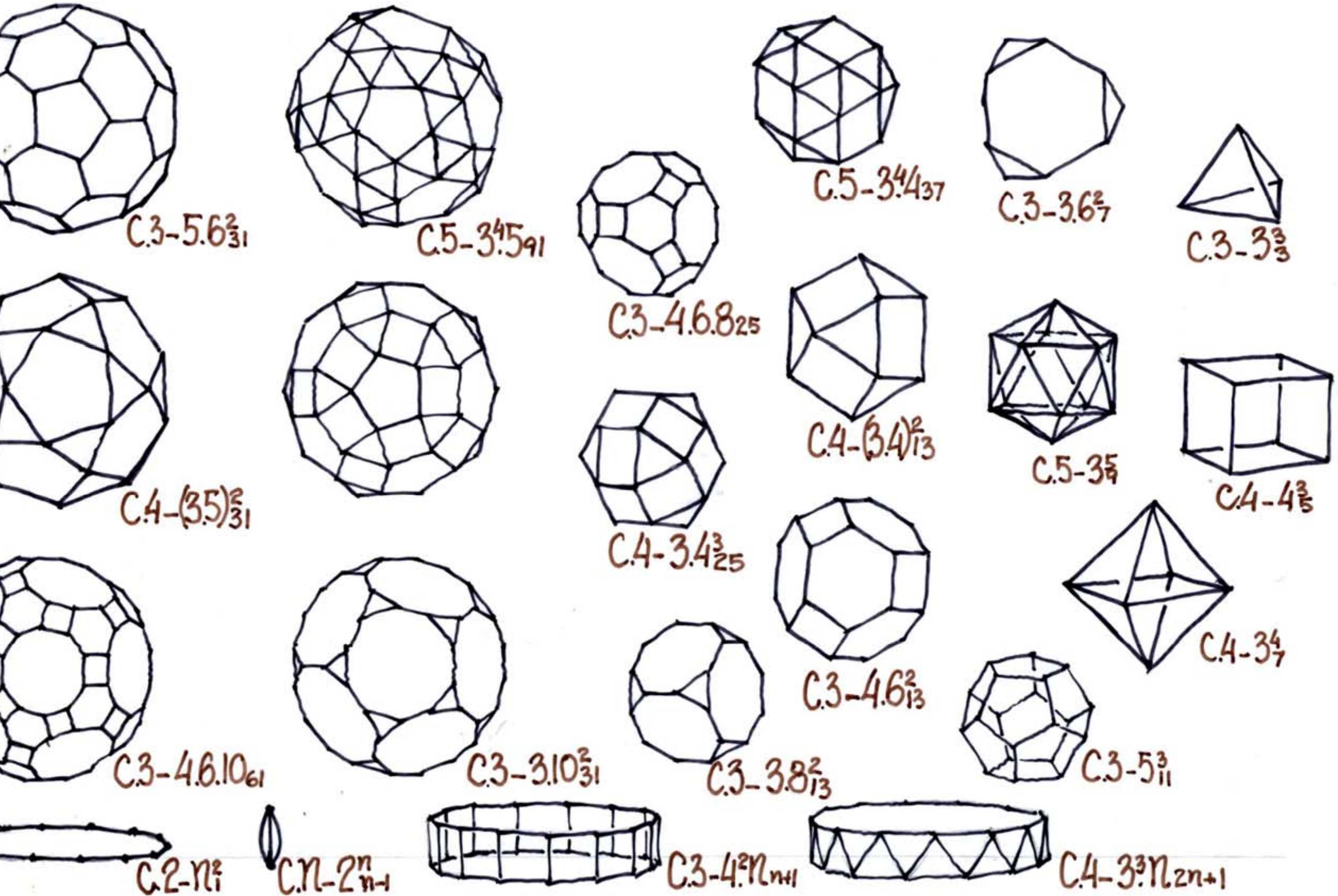
1

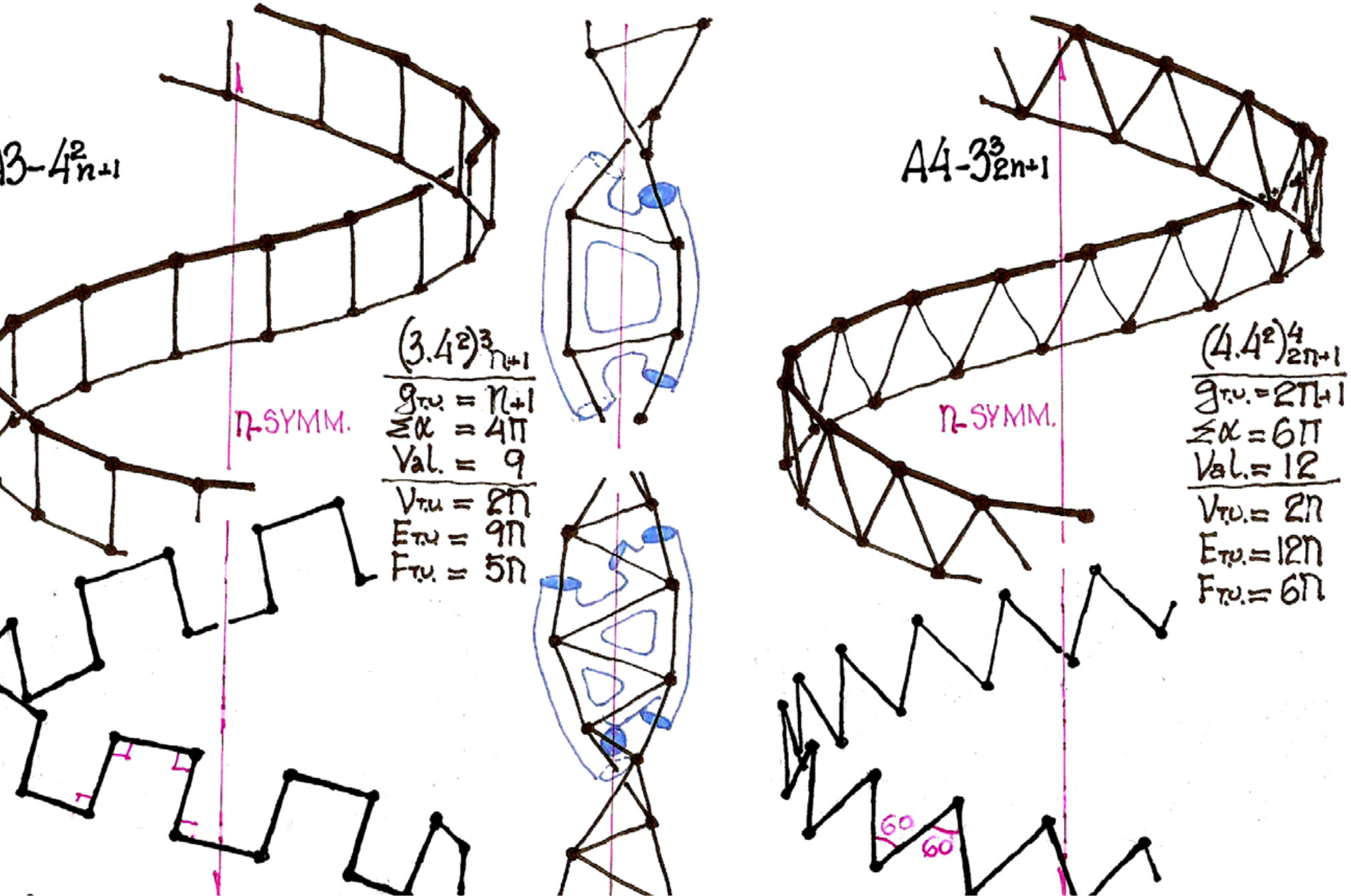


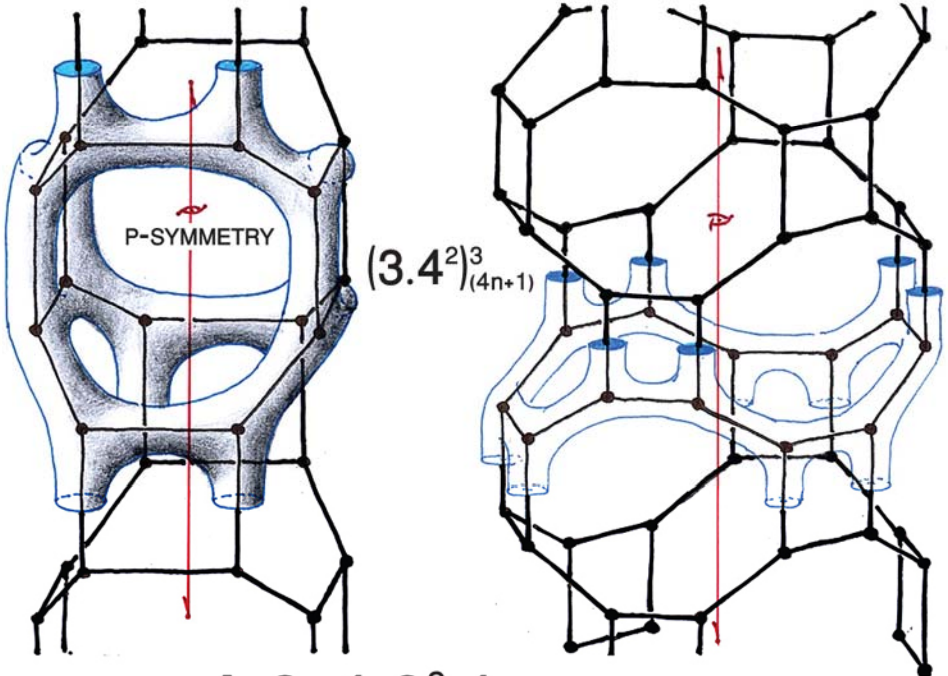




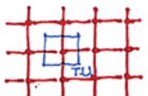
$\text{Den.}_{(3-6.8^{2}_{25})} = 0.493078451\ a/a^{3}$


C.3-5.6$^2_{31}$
C.5-3^4.5$_{91}$
C.3-4.6.8$_{25}$
C.5-3^4.4$_{37}$
C.3-3.6$^2_7$
C.3-3$^3_3$
C.4-(3.5)$^2_{31}$
C.4-(3.4)$^2_{13}$
C.5-3$^5_7$
C.4-4$^3_5$
C.4-3.4$^3_{25}$
C.3-4.6$^2_{13}$
C.4-3$^4_7$
C.3-4.6.10$_{61}$
C.3-3.10$^2_{31}$
C.3-3.8$^2_{13}$
C.3-5$^3_{11}$
C.2-n$^2_1$
C.n-2$^n_{n-1}$
C.3-4^2.n$_{n+1}$
C.4-3^3.n$_{2n+1}$

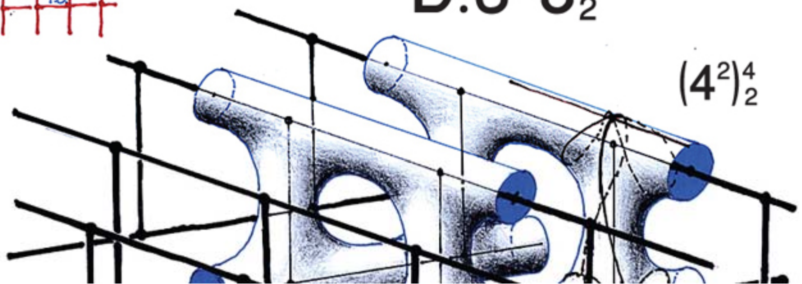

3-4²n+1
n-SYMM.
(3.4²)³n+1
gT.U. = n+1
Σα = 4π
Val. = 9
VT.U = 2n
ET.U = 9n
FT.U. = 5n
A4-3³2n+1
n-SYMM.
(4.4²)⁴2n+1
gT.U. = 2n+1
Σα = 6π
Val. = 12
VT.U. = 2n
ET.U. = 12n
FT.U. = 6n
60
60

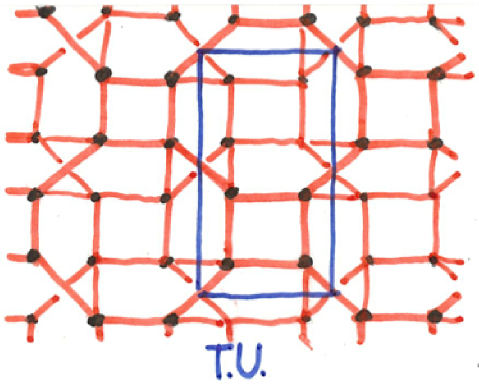


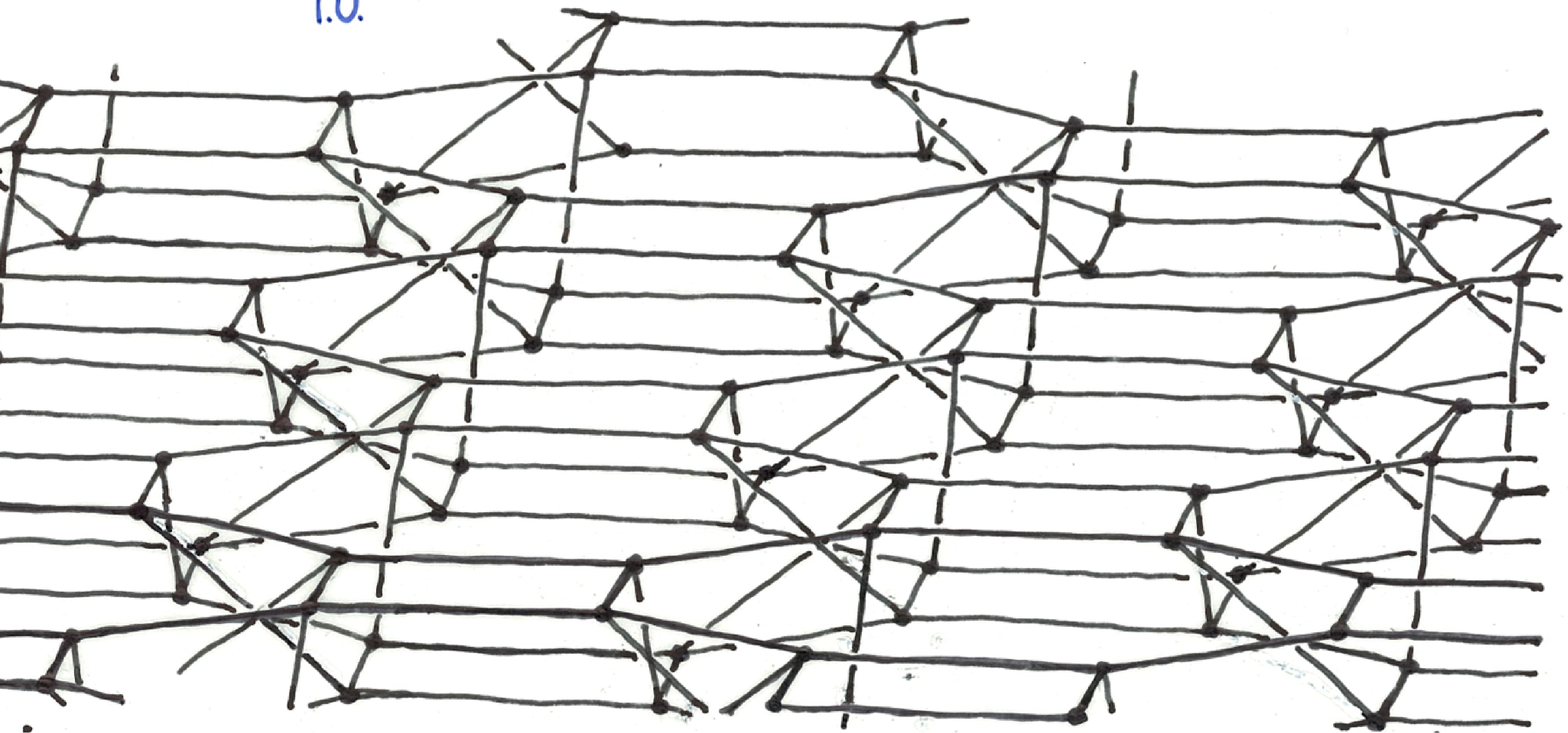
A.3-4. $8^2.4n_{(4n+1)}$

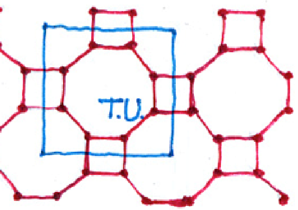


D.3-8^4_2




T.U.





$$(4.4^2)^4_{17}$$

$g_{T.U.} = 17$

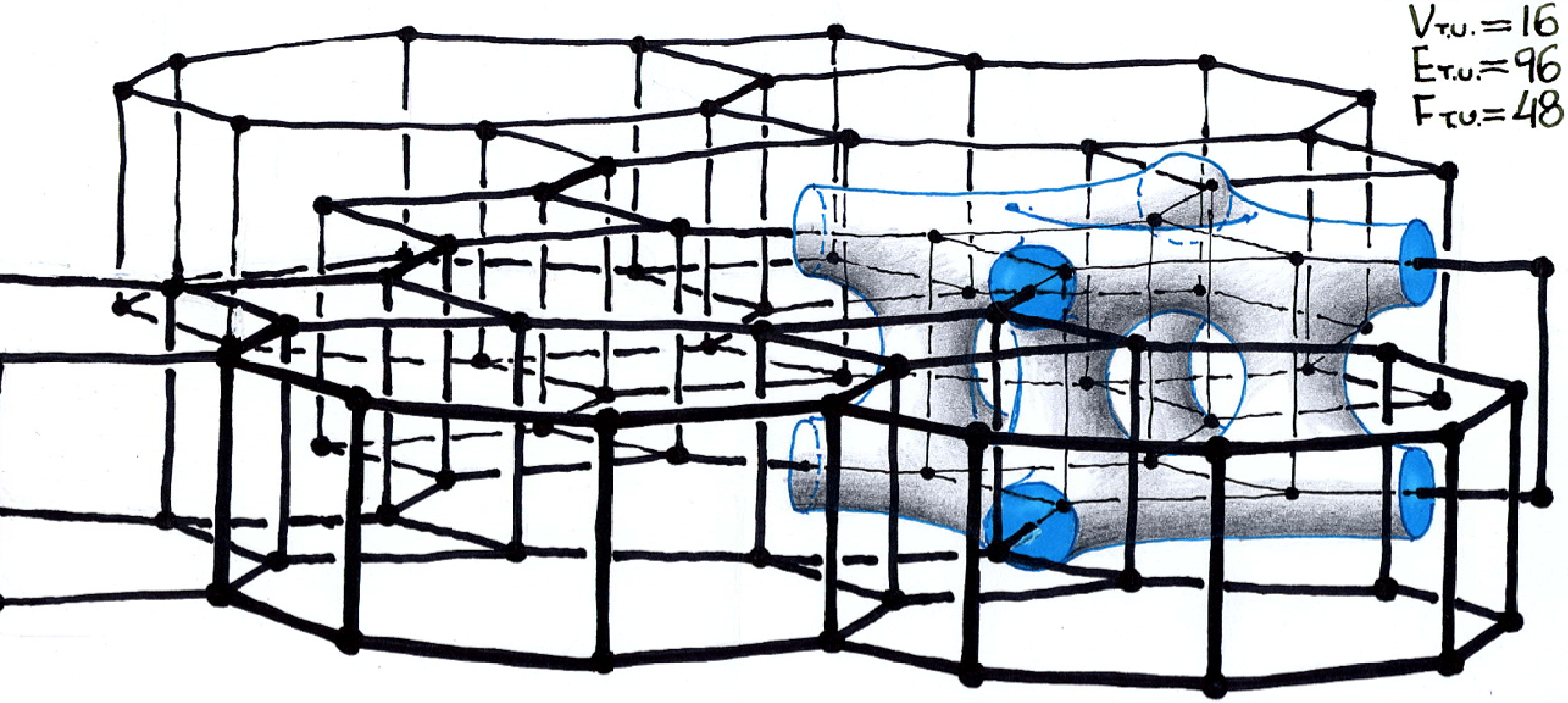
$\sum\alpha = 6\pi$

$Val. = 12$

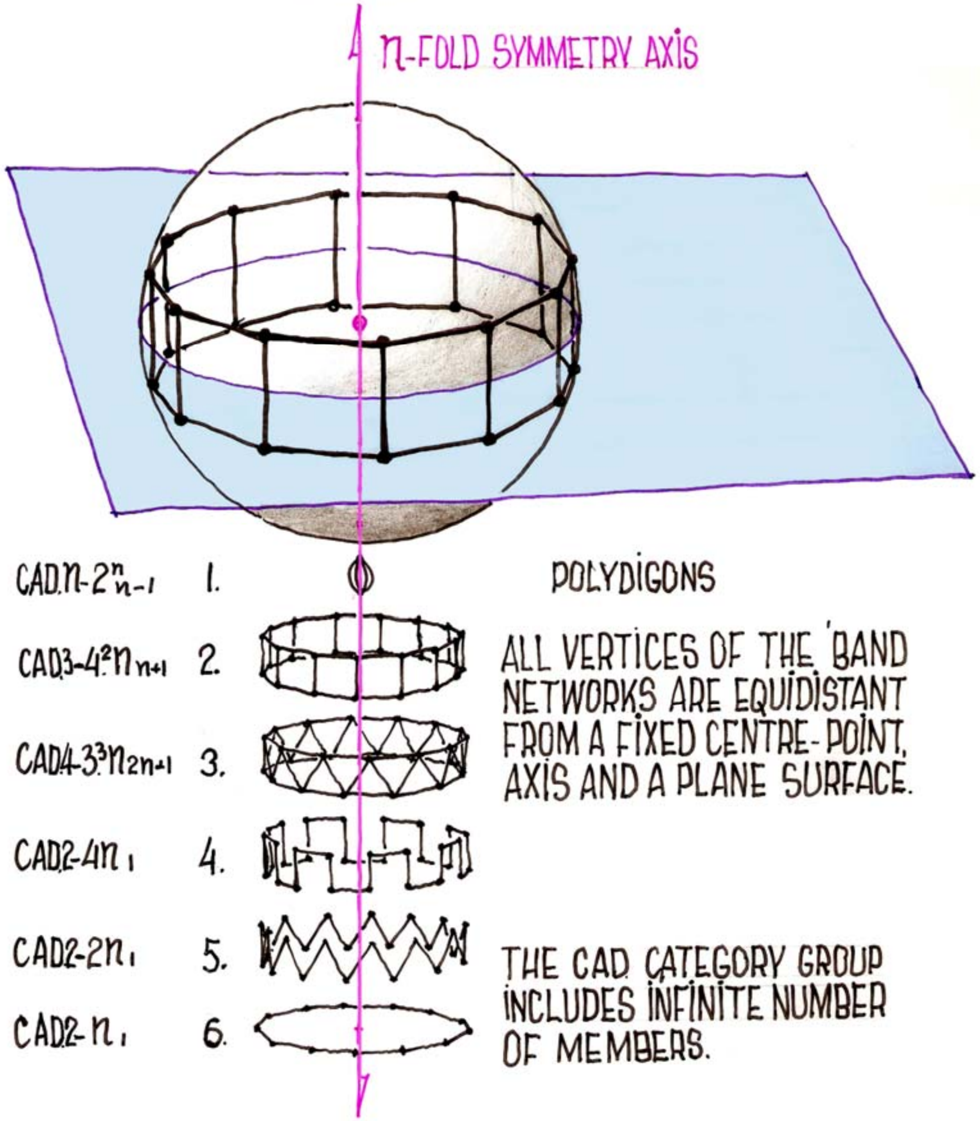
$V_{T.U.} = 16$

$E_{T.U.} = 96$

$F_{T.U.} = 48$



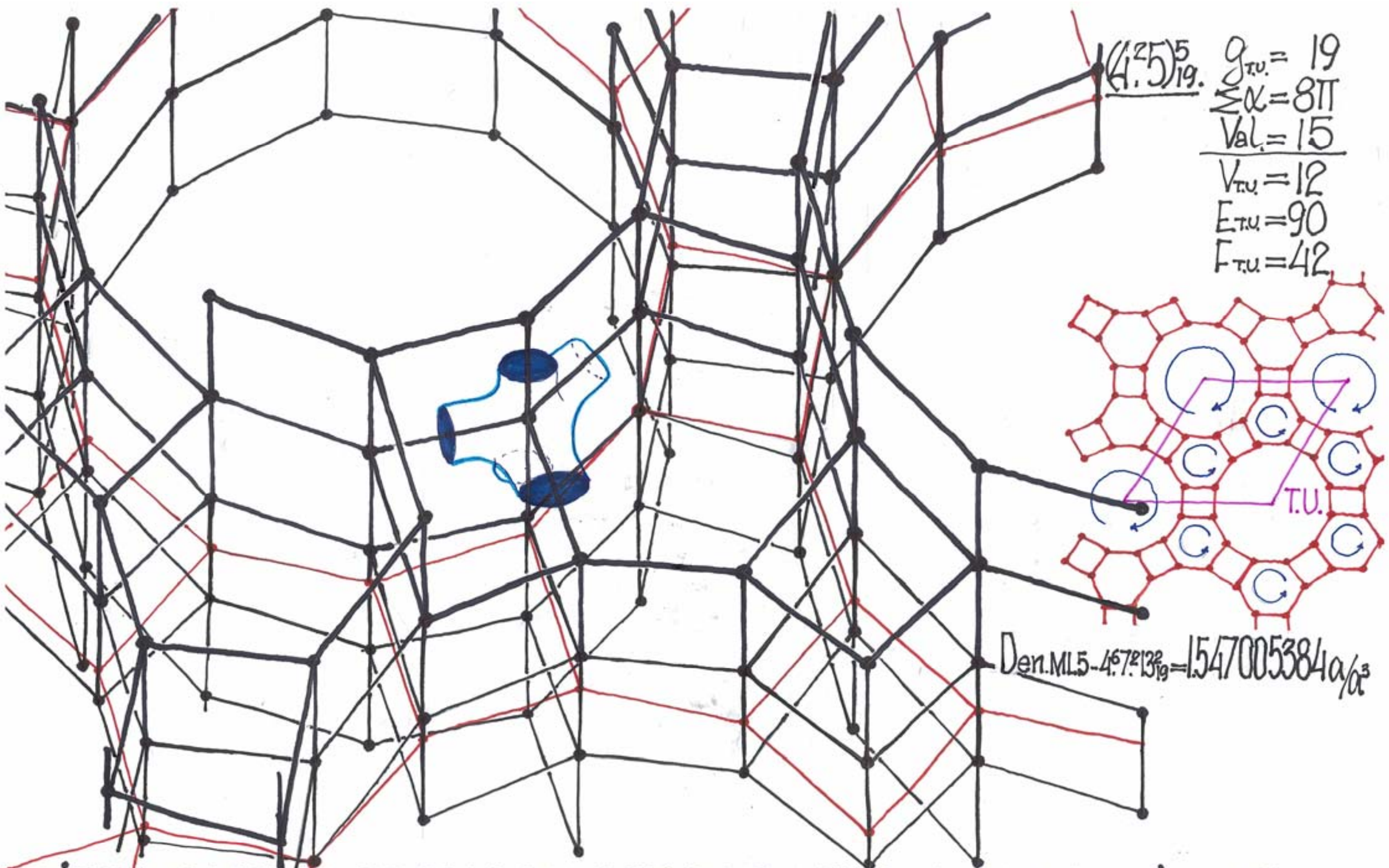
IFORM DOUBLE-LAYER TETRAVALENT $D.4\text{-}4^3.8^2_{17}$ SPACE LATTICE



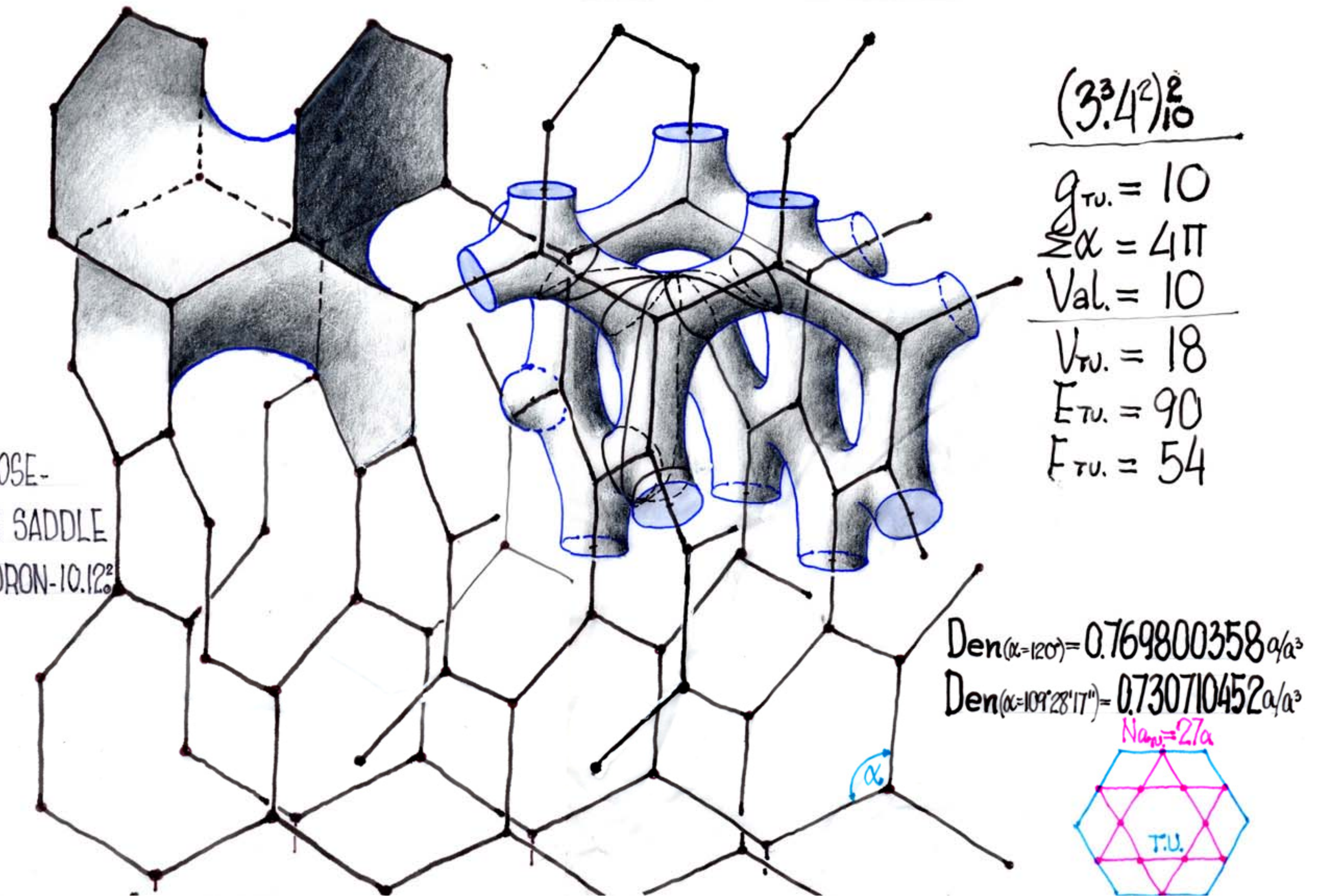
ALL VERTICES OF THE 'BAND NETWORKS ARE EQUIDISTANT FROM A FIXED CENTRE-POINT, AXIS AND A PLANE SURFACE.

THE CAD CATEGORY GROUP INCLUDES INFINITE NUMBER OF MEMBERS.

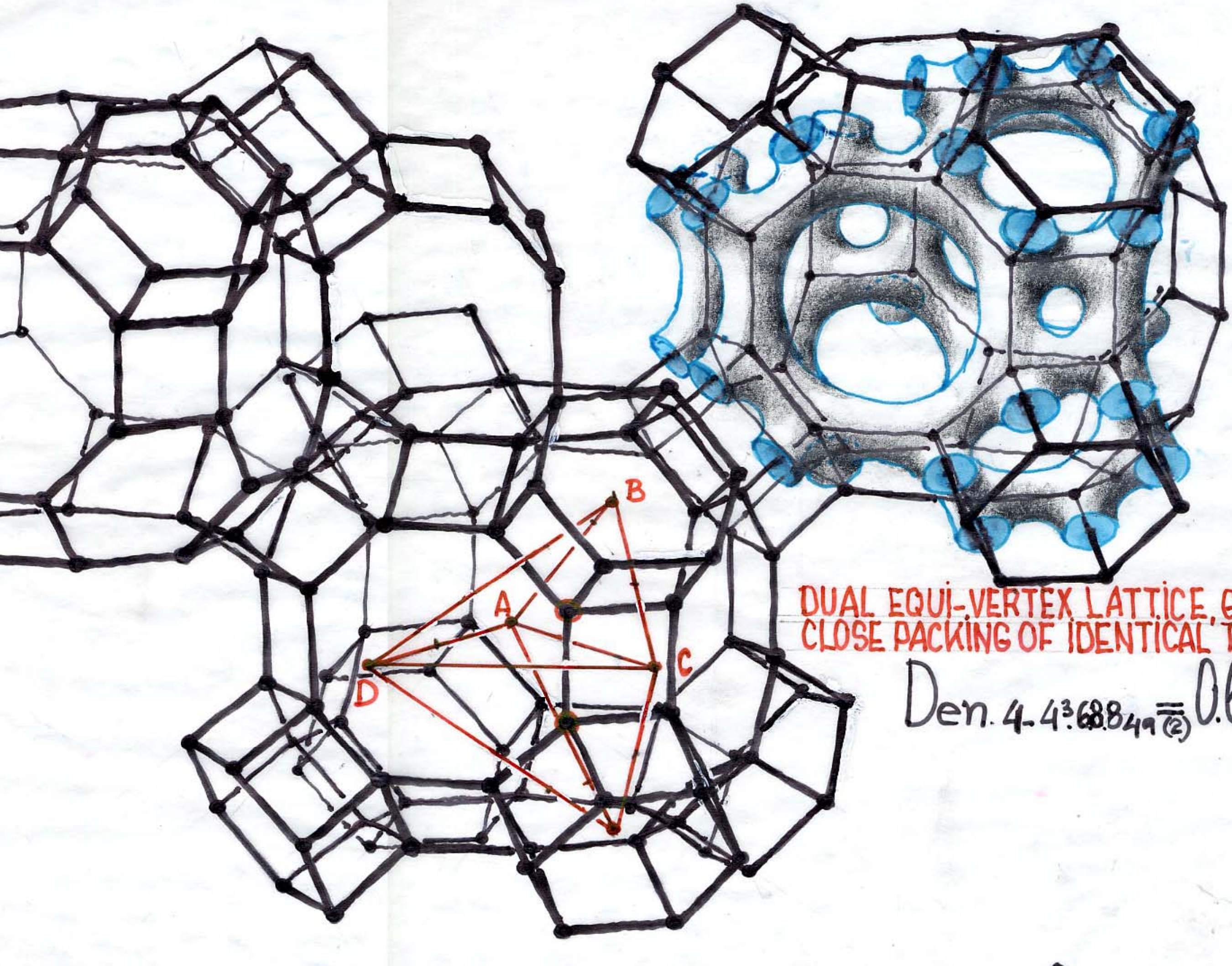
DISTINCTIVE GROUP OF PRIMITIVE UNIFORM BAND-



UNIFORM MULTI-LAYER PENTAVALENT ML5-$4^6.7^2.13^2_{19}$ SPACE LATTICE AND RELATED SPONGE SURFACE AND UNIFORM SPONGE POLYHEDRON



OSE-
SADDLE
DRON-10.12
(3³.4²)²₁₀
g T.U. = 10
Σα = 4π
Val. = 10
V T.U. = 18
E T.U. = 90
F T.U. = 54
Den(α=120°)= 0.769800358 a/a³
Den(α=109°28'17")= 0.730710452 a/a³
Na T.U. = 27a
T.U.
α



$$(4.4^2)^4_{49}$$

$$g_{T.U.} = 49$$

$$\Sigma\alpha = 6\pi$$

$$Val. = 12$$

$$V_{T.U.} = 48$$

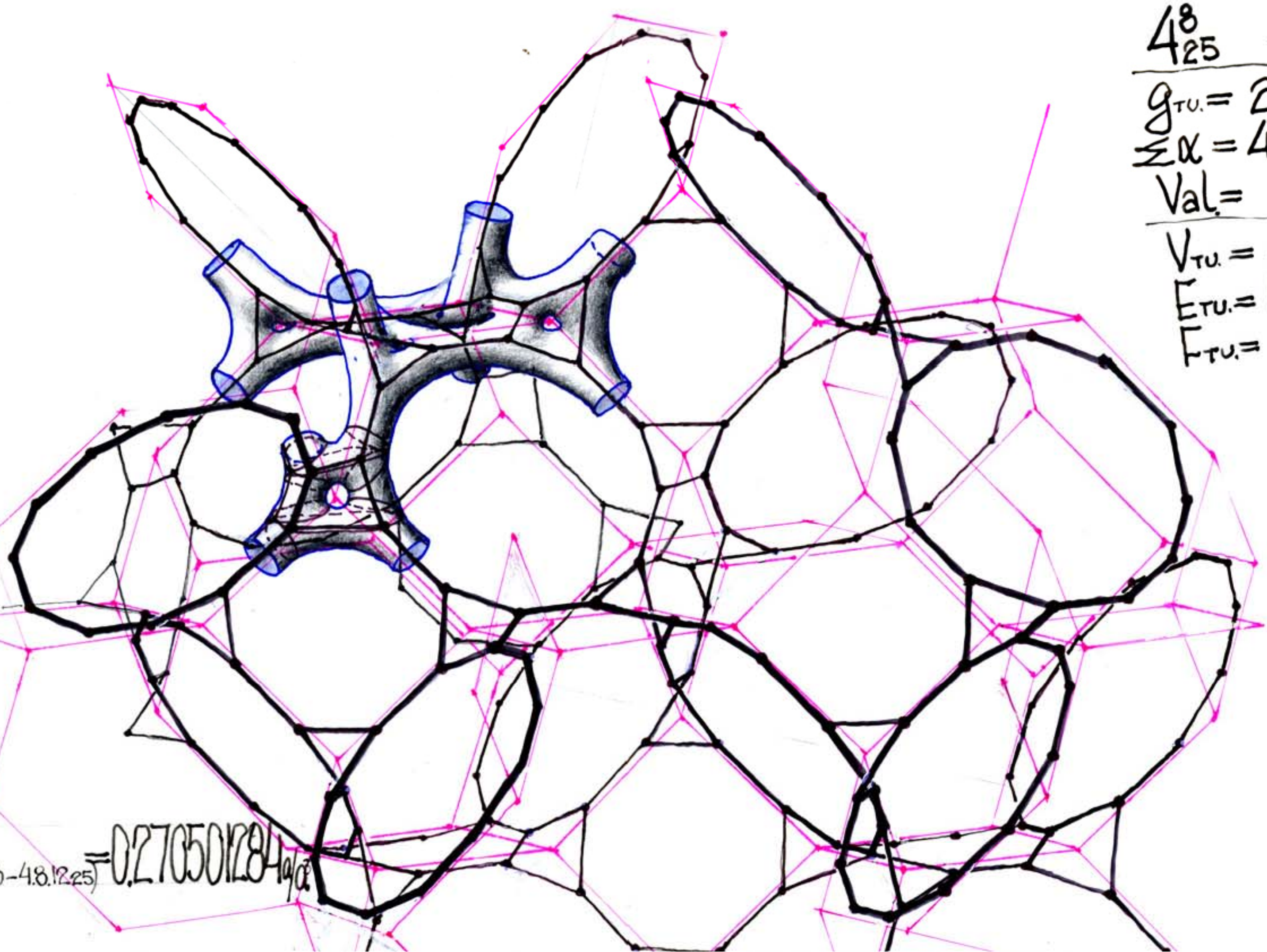
$$E_{T.U.} = 288$$

$$F_{T.U.} = 144$$

DUAL EQUI-VERTEX LATTICE, GENERATED BY CLOSE PACKING OF IDENTICAL TETRAHEDRA-ABCD.

$$Den._{4\text{-}4^3.68.8_{49(2)}} = 0.639610306\, a/a^3$$

FORM TETRAVALENT $4\text{-}4^3 68.8_{49(2)}$ SPACE LATTICE AND



4^{8}_{25}

$g_{TU.} = 25$

$\Sigma\alpha = 4\pi$

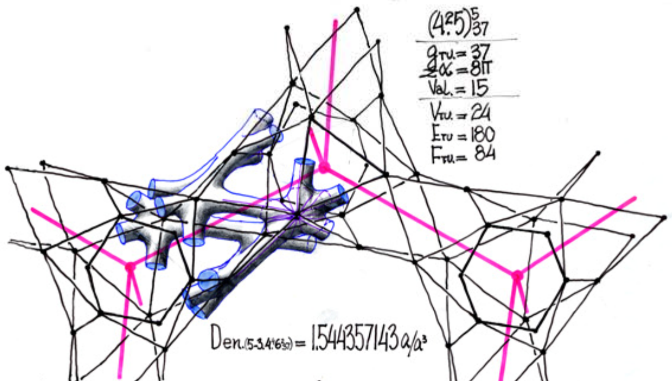
$Val. = 8$

$V_{TU.} = 48$

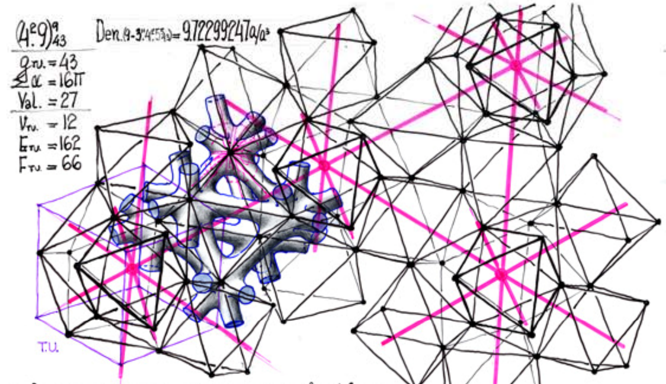
$E_{TU.} = 192$

$F_{TU.} = 96$

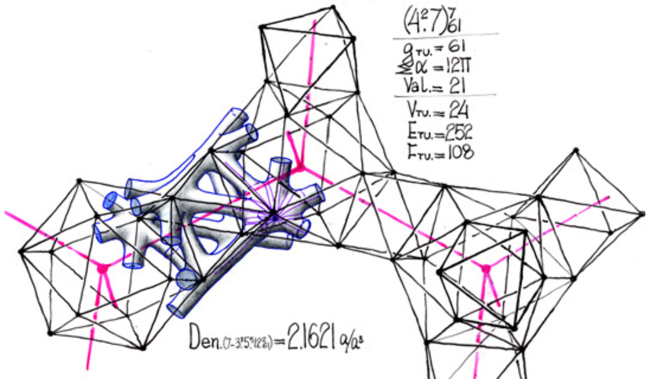
RMI CRYSTALLINE SPACE LATTICES
CAL REPEATING ICOSAHEDRAL SYMMETRY



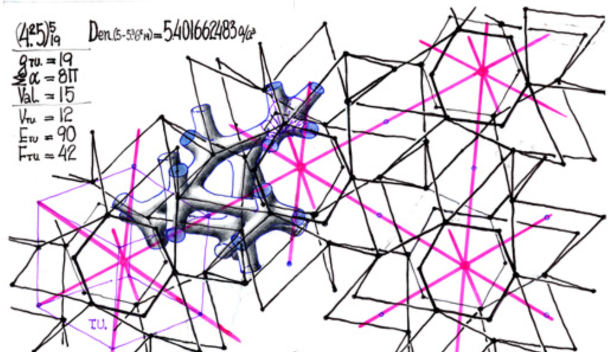
UNIFORM 5-VALENT 5-3.4⁴6²₃₇ SPACE-LATTICE WITH GLOBAL DIAMOND LATTICE SYMMETRY AND RELATED SPONGE SURFACE AND POLYHEDRON.



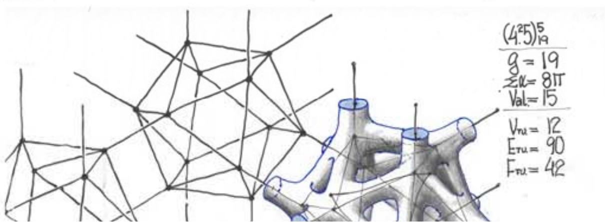
UNIFORM 9-VALENT 9-3¹¹4²5⁵₄₃ SPACE-LATTICE (WITH LOCAL ICOSAHEDRAL SYMMETRY AND GLOBAL CUBE-CENTRED LATTICE SYMMETRY) AND RELATED SPONGE SURFACE AND POLYHEDRON.

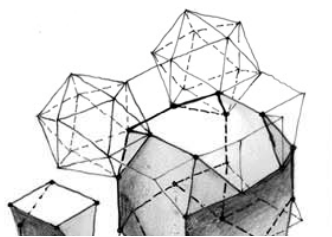


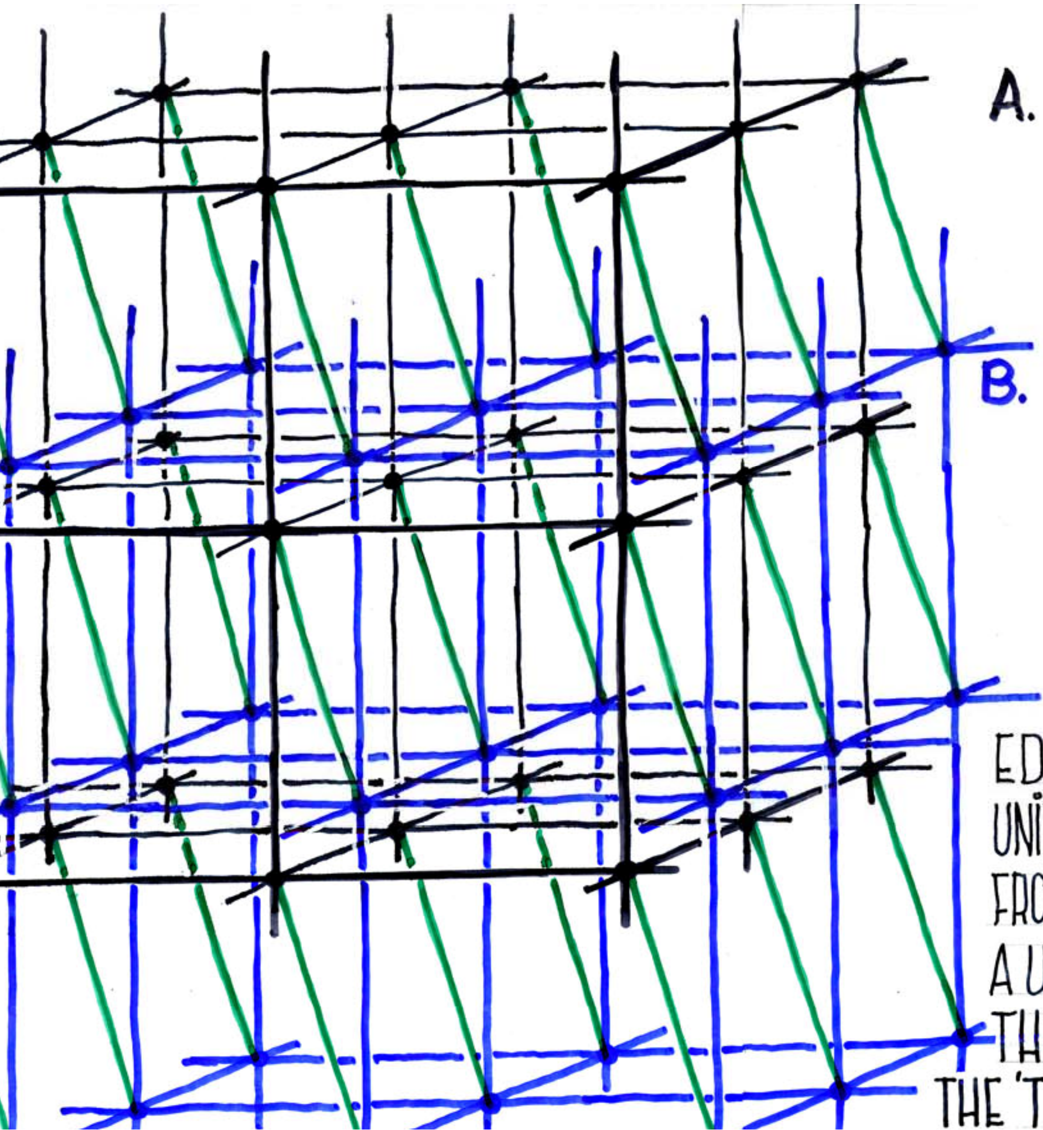
UNIFORM 7-VALENT 7-3⁸5⁵12²₆₁ SPACE-LATTICE (WITH LOCAL ICOSAHEDRAL SYMMETRY AND GLOBAL DIAMOND LATTICE SYMMETRY) AND RELATED SPONGE SURFACE AND POLYHEDRON.



UNIFORM PENTAVALENT 5-5.6²₁₉ SPACE-LATTICE WITH GLOBAL CUBE-CENTRED LATTICE SYMMETRY AND RELATED SPONGE SURFACE AND POLYHEDRON.

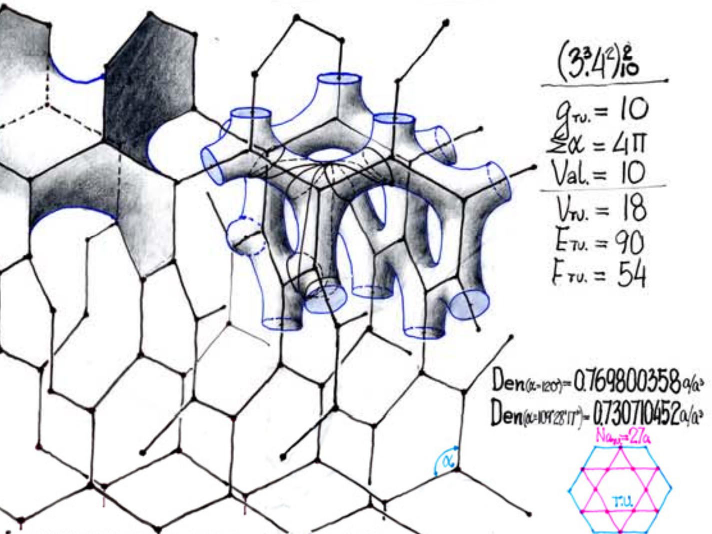




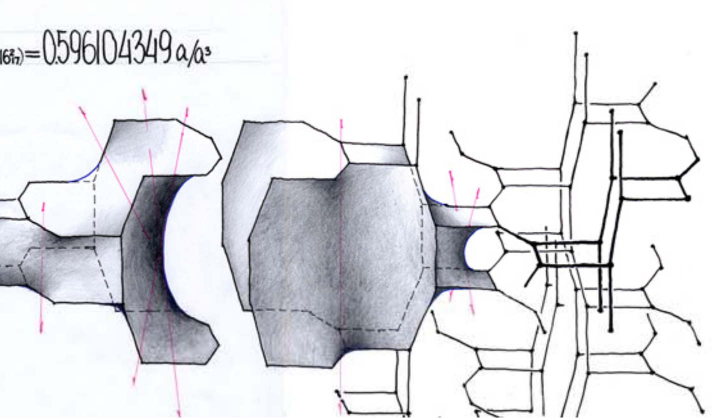


ENTANGLED NETWORKS

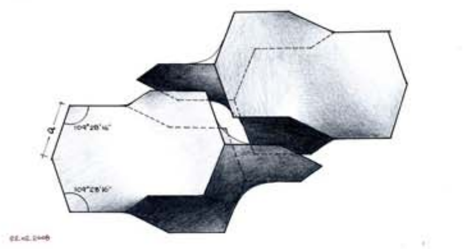
EDGE-LENGTH TRANSLATION OF A UNIFORM HEXAVALENT (CUBIC) LATTICE FROM A-TO B-POSITION, RESULTING IN A UNIFORM SEPTAVALENT LATTICE, THE DENSITY OF WHICH IS 7.00 a/a³.
THE 'TRANSLATION LATTICE' IS A 3-D



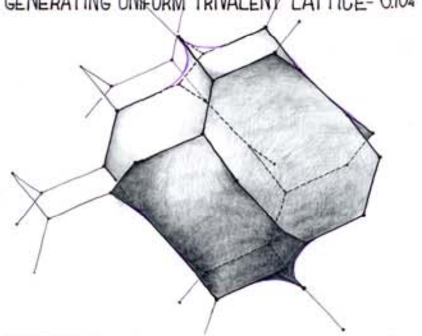
RIVALENT 3-10^3.12$^6_{10}$ SPACE LATTICE AND

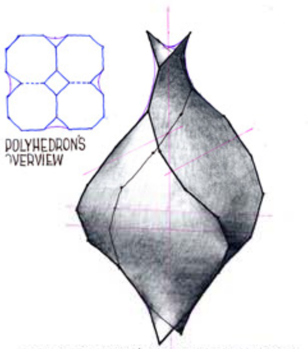


DECA-TETRAHEDRON, A SELF CLOSE-PACKING SADDLE-POLYHEDRON, GENERATING THE UNIFORM TRIVALENT SPACE LATTICE-10$^{10}_3$.

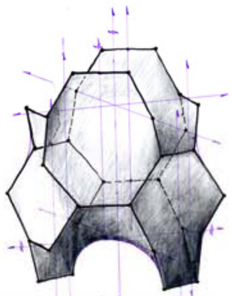


SELF CLOSE-PACKING SADDLE-POLYHEDRON GENERATING UNIFORM TRIVALENT LATTICE- 6.10$^5_4$



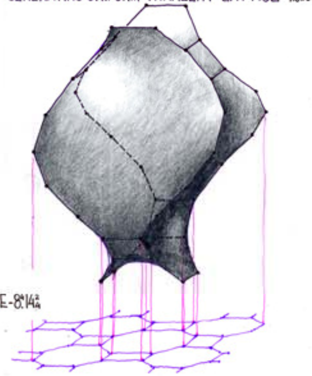


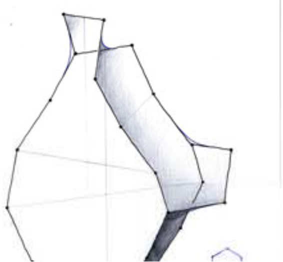
SELF CLOSE-PACKING SADDLE-POLYHEDRON GENERATING UNIFORM TRIVALENT LATTICE-4.14



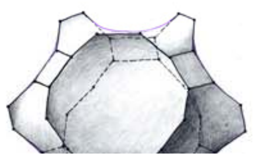
SELF CLOSE PACKING SADDLE POLYHEDRON GENERATING UNIFORM TRIVALENT SPACE LATTICE-8.14

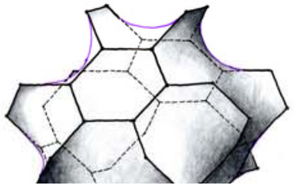
SELF CLOSE-PACKING SADDLE-POLYHEDRON GENERATING UNIFORM TRIVALENT LATTICE-4.8.16





SELF CLOSE-PACKING SADDLE-POLYHEDRON GENERATING UNIFORM TRIVALENT LATTICE - THE 4.12





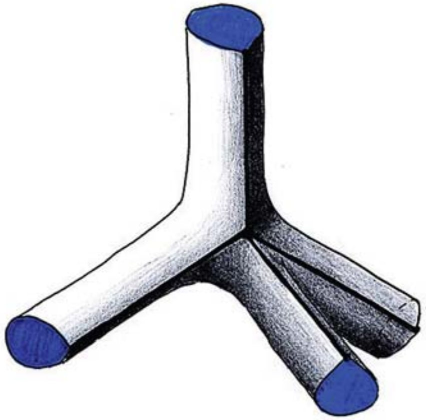
3D NETWORKS (UNIFORM OR NONE), TO BE INCORPORATED IN THE ‘PERIODIC TABLE OF THE POLYHEDRAL UNIVERSE’, HAVE TO POSE AS POLYHEDRAL SURFACE CONFIGURATIONS. THAT COULD BE ACHIEVED ONCE THE 3D NETWOTK IS EMBEDDED IN A SPONGE SURFACE, SOLVED AND REPRESENTED AS A UNIHEDRON; A POLYHEDRON WITH ONE CONTINOUS FACE ONLY. ALL CONCEIVABLE 3D NETWORKS, AS UNIHEDRA, MAY BE JOINED TO THE POLYHEDRAL UNIVERSE AND BE REPRESENTED WITHIN THE BOUNDS OF THE PERIODIC TABLE.

ALL CONCEIVABLE 3D NETWORKS, AS UNIHEDRA, WHETHER UNIFORM OR NOT, SHARE ONE AND THE SAME PLANE SURFACE LOCATION PATTERN, RESERVED FOR ALL UNIHEDRA IN 3D SPACE, MATHEMATICALLY EXPRESSED AS:

$\Sigma\alpha=2\Pi(V-1)$

DIAMOND PV.4-6_3^{12} LATTICE

AND THE RELATED DIAMOND **UNI-HEDRON**



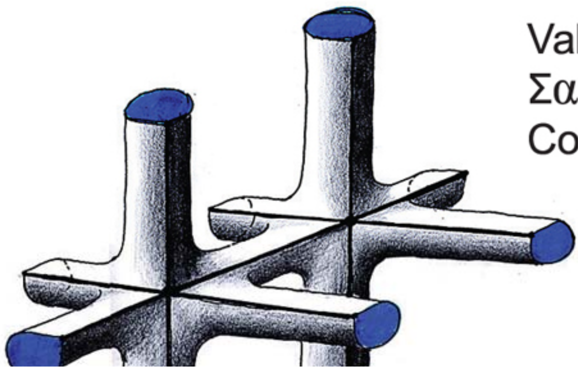
Val. = 4

$\Sigma\alpha = 6\pi$

$Con._{T.U.} = 3 \equiv g_{T.U.}$

CUBIC PV.6-4_3^{12} LATTICE

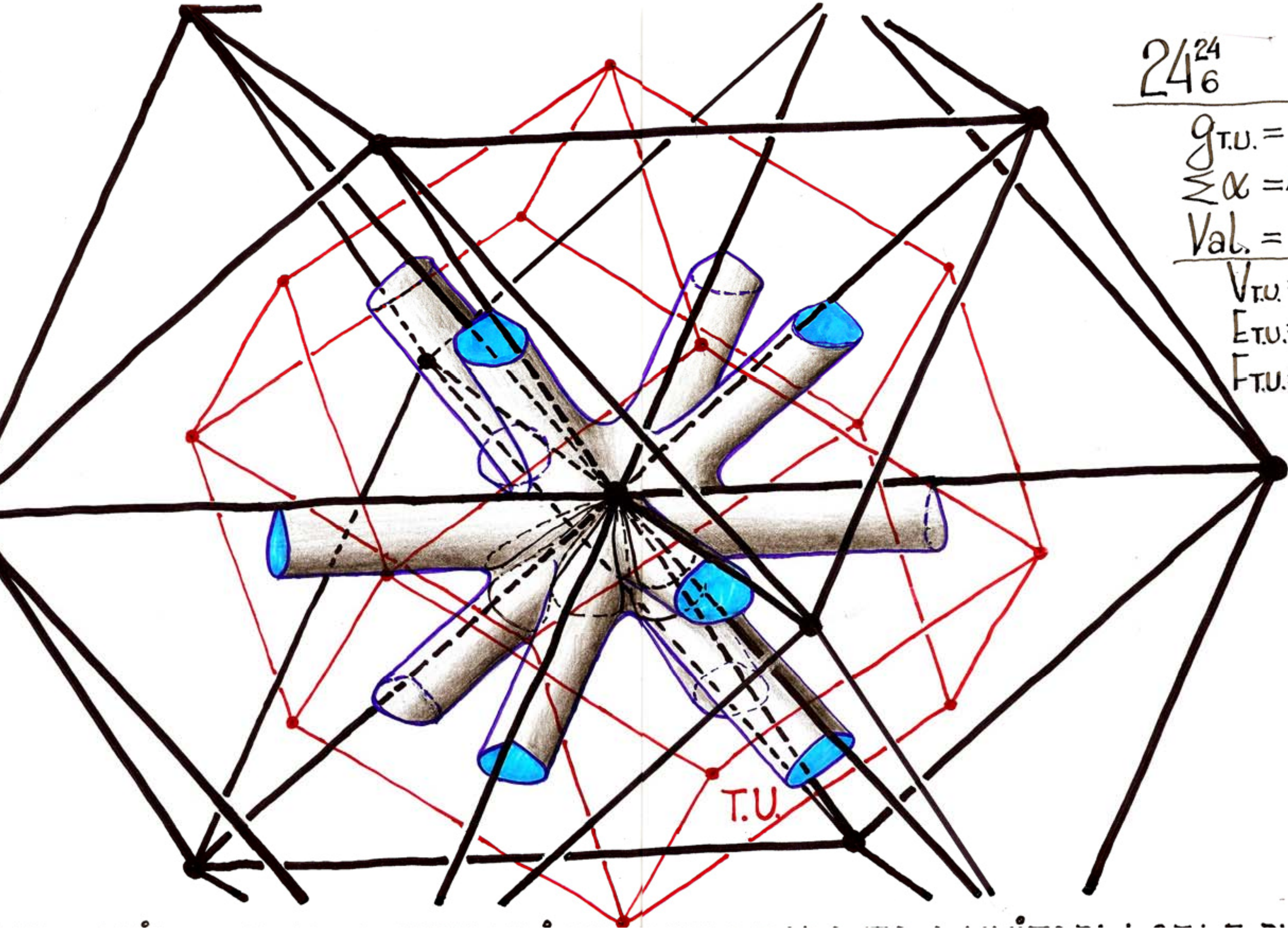
AND THE RELATED CUBIC **UNI-HEDRON**



Val. = 6

$\Sigma\alpha = 10\pi$

$Con._{T.U.} = 3 \equiv g_{T.U.}$

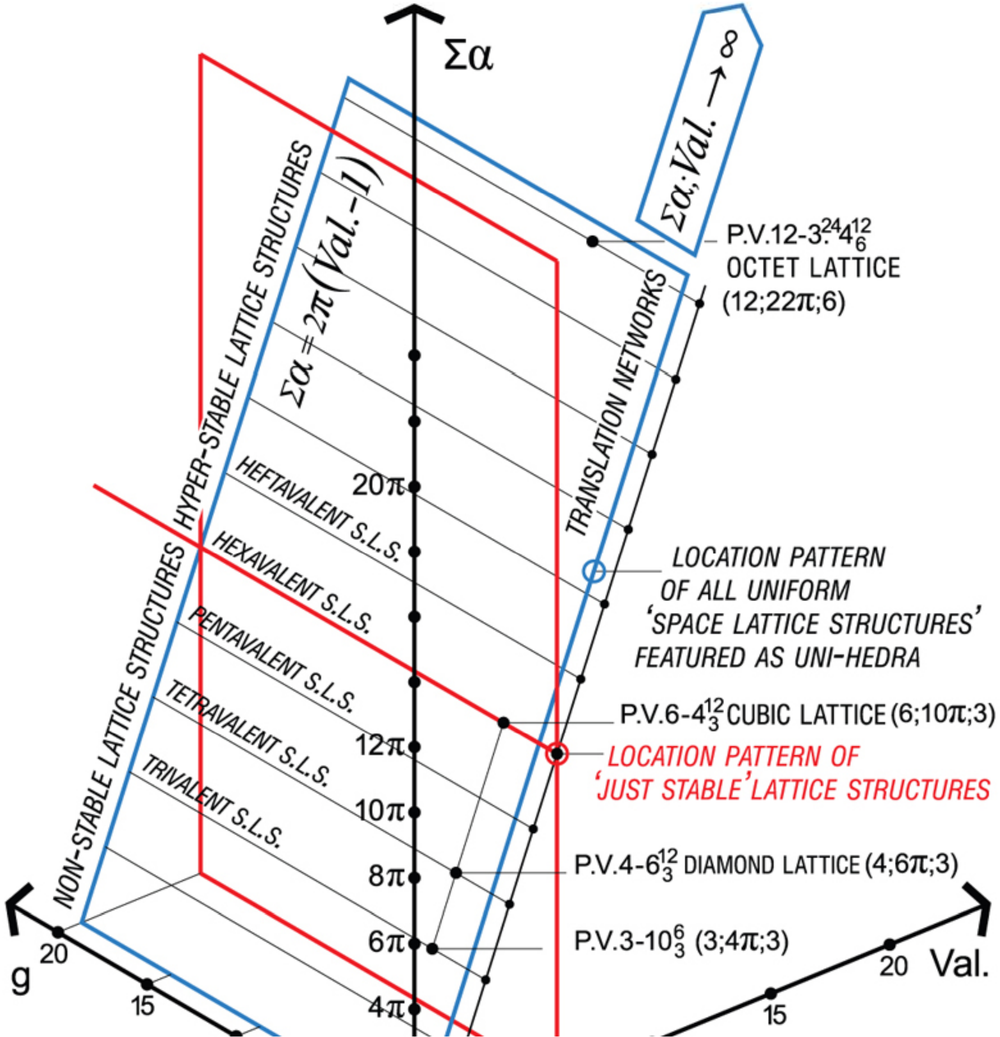


$$24^{24}_{6}$$

$$g_{T.U.} = 6$$
$$\Sigma\alpha = 46\pi$$
$$Val. = 24$$

$$V_{T.U.} = 1$$
$$E_{T.U.} = 12$$
$$F_{T.U.} = 1$$

Featuring Uniform Space Lattice configurations as embeddable in genetically associated sponge surfaces and perceiving them as tessellations of such surfaces and therefore legitimate polyhedral structures, corresponding to same primary parameters (*Val*; *Σα* & Con. ≡ *g*) justifies their sharing in the theoretical umbrella of 'The Periodic Table of the Polyhedral Universe'.



Σα
Σα;Val.→∞
Σα = 2π(Val.-1)
HYPER-STABLE LATTICE STRUCTURES
NON-STABLE LATTICE STRUCTURES
TRANSLATION NETWORKS
HEFTAVALENT S.L.S.
HEXAVALENT S.L.S.
PENTAVALENT S.L.S.
TETRAVALENT S.L.S.
TRIVALENT S.L.S.
P.V.12-3:24 4 12 6
OCTET LATTICE
(12;22π;6)
LOCATION PATTERN
OF ALL UNIFORM
'SPACE LATTICE STRUCTURES'
FEATURED AS UNI-HEDRA
P.V.6-4 12 3 CUBIC LATTICE (6;10π;3)
LOCATION PATTERN OF
'JUST STABLE' LATTICE STRUCTURES
P.V.4-6 12 3 DIAMOND LATTICE (4;6π;3)
P.V.3-10 6 3 (3;4π;3)
20π
12π
10π
8π
6π
4π
g
20
15
Val.
20
15

IN CONCLUSION

With the introduction of sponge polyhedra, spherical, toroidal and hyperbolical, and relaxation of definitions (admissibility of any polyhedral configuration that complies with the celebrated Euler's theorem), the polyhedral universe has expanded dramatically. Metaphorically speaking, it exploded from Ptolemaic- Euclidean world picture to our contemporary

The primary parameters of *V*al.$_{AV.}$, $\Sigma\alpha_{AV.}$ and *g*, seem to capture the essence of the polyhedral topological nature, and when used as coordinates of a Cartesian 3D space, provide for an environment, in which every conceivable individual 3D polyhedron has a unique point representation .

All shared properties are posing as discernible, mathematically embraced location patterns

‘THE PERIODIC TABLE OF THE POLYHEDRAL UNIVERSE’ PROVIDES A THEORETICAL UMBRELLA FOR THE ENTIRE POLYHEDRAL DOMAIN IN 3D SPACE, EMBRACING ALL ‘THEORETICALLY IMAGINABLE’ POLYHEDRA THAT CONFORM WITH THE CELEBRATED EULER’S THEOREM AND EQUATION OF $V-E+F=2(1-g)$.

OF SPECIAL INTEREST AND IMPORTANCE ARE LOCATION PATTERNS RELATING TO:

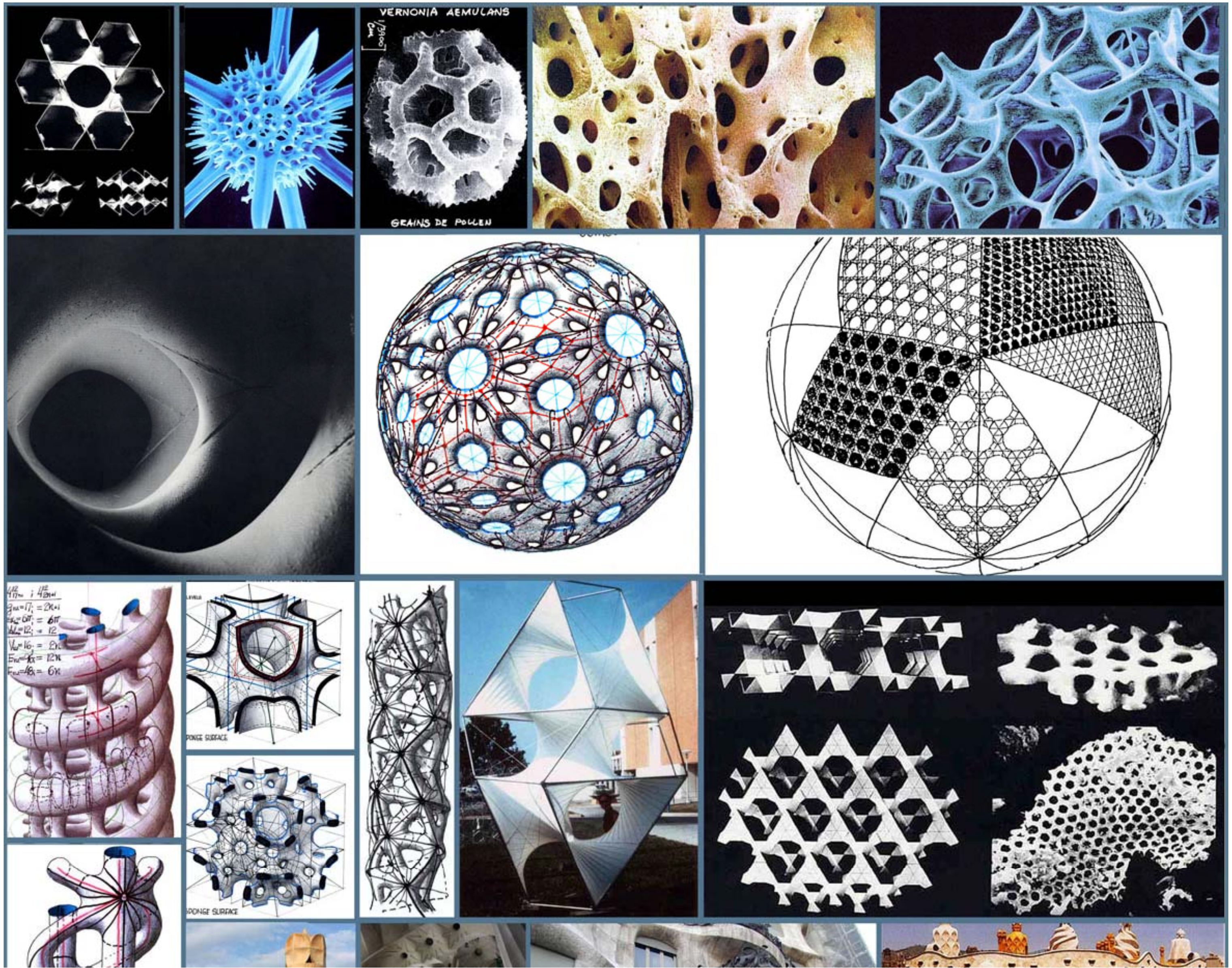
MACRO-CATEGORIZATION – CLASSIFICATION OF POLYHEDRA INTO:

- FINITE-CONVEX-SPHERICAL POLYHEDRAL 2D-MANIFOLDS WITHIN THE g=0 DOMAIN, WITH $\Sigma\alpha \geq - 2\Pi; < 2\Pi$.
- TOROIDAL POLYHEDRA WITHIN THE g=1 DOMAIN, WITH $\Sigma\alpha = 2\Pi$.
- HYPERBOLICAL SPONGE POLYHEDRA, WITHIN THE $g \geq 2$ DOMAIN AND $\Sigma\alpha > 2\Pi$.

LOCATION PATTERN OF 3D NETWORKS, EXPRESSED AS 3D UNIHEDRA.

LOCATOIN PATTERN RELATING TO STABILITY, NON-STABILITY AND HYPER-STABILITY OF POLYHEDRAL LATTICE AND PLATE STRUCTURES.

With some extrapolation of the perceiving mind it is right to claim that the sponge phenomenon, with its porosity and permeability characteristics, is central to the physical morphological nature of the human habitat, and represents its defining imagery.


VERNONIA AEMULANS
GRAINS DE POLLEN