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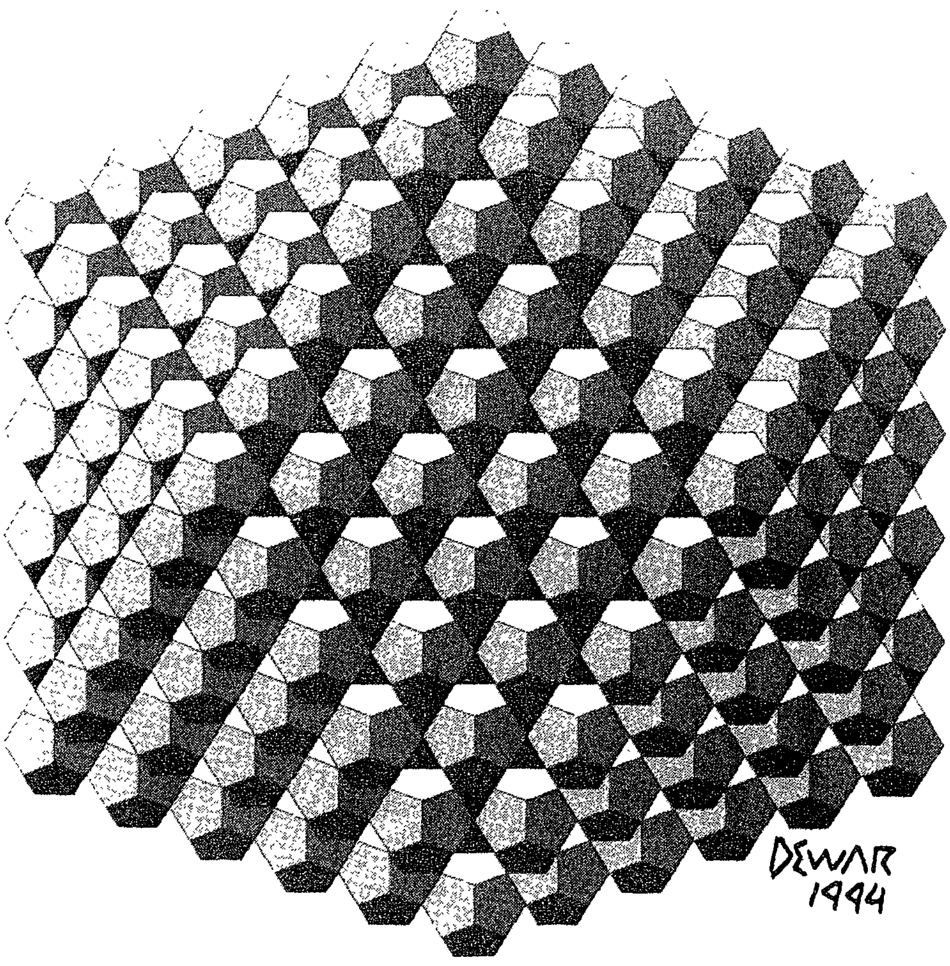

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An introduction into

THE DEVELOPEMENT PATTERN OF GEOMETRICAL STRUCTURES

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The geometrical structures or forms we usually call polyhedrons are most frequently ordered into two or three groups : 1) The Platonic Solids, 2) The Archimedean Solids , and 3) A group of socalled irregular solids. The last group is seldom mentioned and not accepted in the normal encyclopædia. These three groups are based on the assumption that the regularity of polyhedrons is primarily dependent on the regularity of their outer faces.

This assumption gives a wrong view on the nature of polyhedrons. In this introduction to a thesis on a developement pattern of polyhedrons it is the aim to give a new insigth into the nature of polyhedrons. All known polyhedrons will be included in this new order or genus and will fit into it only by way of their developement pattern stage. This new "instrument" will enable us to find a number of new polyhedrons which are regular while regularly formed. We will describe how each polyhedron is structurally and formally based upon two others : A polyhedral pair. The neccessary exception to this is the tetrahedron. We will also try to describe and give a name to a new primary interchange which fills the last gap in the developement pattern of the polyhedrons.

TWO-FREQUENCY AND CROSSFORMATION

The pair of primary changes are: Two-frequency and crossformation

These changes can work on any wedding of polyhedral pairs producing indefinitely polyhedrons with less and less degree of regularity. However another pair of primary developement changes also works on certain weddings which will then again produce a degree more regular polyhedrons. The rhombic dodeca-cubocta wedding is one of those.

PRIMARY PAIR OF CHANGES NUMBER TWO

What triggers this second pair of primary changes is among other things the fact that the preceeding changes (crossformation *and two-frequency) after two appliances have built into the* polyhedrons in question structurally unstable elements i.e. an open square in one and fourfold symmetrical corners in the other.

This second pair of changes makes clear the fact that it is misleading to call polyhedrons "solids" because a mass is structurally unchangable. It is more appropriate to call them edge-structures.

JITTERBUG

The well known half of the second pair of developement change is called jitterbug. It takes place when outside pressure works f.ex. on the structurally unstable cubocta : Its six squares take on rhombic shapes and will inevitably fold together to form an octa if it were not hindered by its wedding partner the rhombic dodeca which simultanously is undergoing a change. Thus the squares stop folding and its triangles stop rotating as the distance between each two of its nearing corners of a former square frame is the same as the overall .edgelength of the polyhedron beeing formed : An icosahedron (See figure page 11). All the while as the change takes place the edges of the polyhedral pair remain in a 90 degree position. The triangles rotate exactly 22°14′19.3″ and thus the centric lines of the triangles (new and old) divide their sides in the ratios 1 : 1.6180339 and 1 : 2.6180339 (golden ratio in first and second power).

TANGO

The other half of the second primary change until now not described which takes place simultanously with the jitterbug is the "tango". It turns the rhombic dodeca into a dodecahedron f.ex. The rhombic dodecahedron has eigth soft and six sharp corners. The eigth soft corners correspond in space with the corners of a tetra wedding. In fact all polyhedral weddings have this eigth fixed points included in the crossformation or tango type polyhedron. In tango the points are fixed but the twelf beams between them work as axis of the twelf faces which turn and change their form at the same time due to outside pressure.

At each of the six sharp corners corresponding to the corners of an octa in wedding the edges *now part in two and move in opposite directions* . As the new faces can only be flat the moving edge parts also move inwards and the edges therefore shorten. The movement stops when the distance between the departing edges is the same as the overall edgelength of the just formed polyhedron : A dodecahedron.

The changes two-frequency and crossformation double the number of edges of each succeeding pair. On the other hand jitterbug and tango only add 1/4 more edges to their new formations as one pair changes into another.

THE HARMONY OF RATIOS

What do all these ratios stand for ? This is a question that will take a long time to answer. But the answer must lie in the fact that the returning ratios like the family-ratios can be expressed with only a handful of logical angles. And also that they can be expressed as sine and cosine of logical angles like:

One part of equal division of a full circle like 90°, 72°, 60°, 45^0, 36^0, 30°, and 18° or angles that are building elements of the polyhedrons themselfs like : $70^\circ31'43''$- $54^\circ44'08''$- $35^\circ15'51''$- $31^\circ43'03''$-$58^\circ16'57''$.

To sum up this excursion into the world of geometrical structures: The tetra is the tone C of the structural world. Its size decides the sizes of all other polyhedrons and by doing that reveals that their edgelengths and volumes are related by ratios.. The ratios are functions of certain harmonic angles. The key to this understanding is the developement pattern which has four stages. It now opens up new possibilities to examining infinite number of new structures and ratios.

As the polyhedral geomerty has shown to be repeated in biologic structures built by nature itself it is the hope of the author that this new order of the structural world can be used to explain mathematical systems in other sciences.

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