

HEXA-PLEXUS

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●SIX-SCRUMMED PENTAGRAMS

A structure as shown in Figure 1 is constructed with six pentagons intersecting each other. The structure consists of 30 pieces as shown in Figure 2.

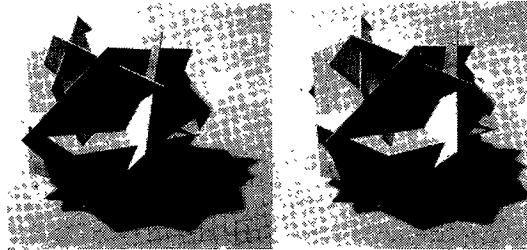


Fig. 1 SIX-SCRUMMED PENTAGRAMS

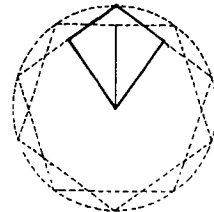


Fig. 2 A piece of SIX-SCRUMMED PENTAGRAMS

If the pentagon is replaced with a pentagonal frame as shown in Figure 3, the structure is as shown in Figure 4. The pentagonal frame in Figure 3 is formed in accordance with the golden section τ . The frames support each other at a contact point.

When the frame has a width w , and a thickness d , the length of one side of the pentagon is:

$$L = 4 (\sqrt{\tau + 2} w + d / \tau) \quad (\tau : \text{The golden section})$$

Figure 6 shows a work formed in this manner. Six pentagonal frames having certain thickness engage with each other. The work, made by assembling 30 pieces in Figure 5, can be a puzzle.

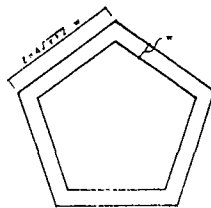


Fig. 3. A piece of SIX-SCRUMMED PENTAGONAL FRAMES

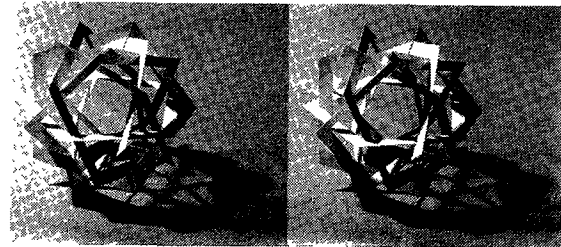


Fig. 4 SIX-SCRUMMED PENTAGONAL FRAMES



Fig. 5 A piece of SIX-SCRUMMED THICK PENTAGONAL FRAMES

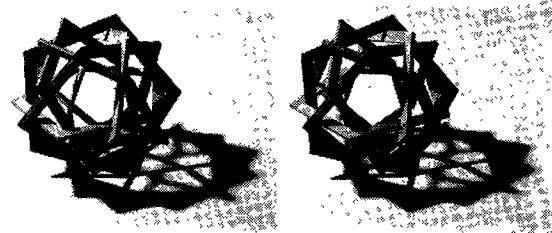


Fig. 6. SIX-SCRUMMED THICK PENTAGONAL FRAMES

●SIX-SCRUMMED FINGERS

If the pentagons are replaced with pentagonal frames made of columnal bars each having a radius r , the length of one side of the pentagon is:

$$l = 4\sqrt{\tau+2} \left(1 + \frac{\sqrt{17\tau+18}}{3\tau+1}\right) r$$

The completed work seems like scrummed people or naturally crossed fingers (Figure 7). Figure 8 is an developed view of a joint part of a finger.

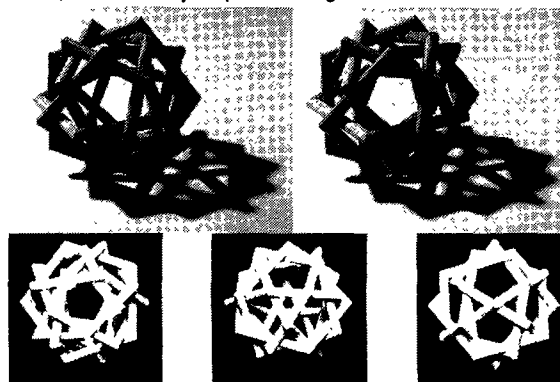


Fig. 7 SIX SCRUMMED FINGERS

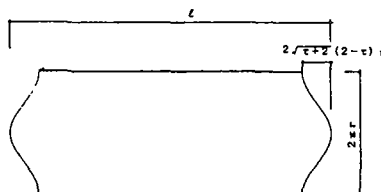


Fig. 8. An develop view of a piece of SIX-SCRUMMED FINGERS

There are heterogeneities of these six-fold constructions, distinguished between clockwise and counterclockwise directions. However, the pentagon can not be distinguished. The element has no play, and if we are careless about the ratio, the structure should be loose. Precise assembling is required. Once completed, the work has a stable and rigid structure. *If we were classicists with an old sense of beauty, we would be satisfied with such a limited formative art, and be absorbed in making the plan minutely.* However, it does not satisfy me, because all of them are self-concluded and there is no chance to expand to infinity. The nature would avoid such an uncomfortable formation.

●HEXA-PLEXUS

A pentagon could not be distinguished between clockwise and counterclockwise direction, indeed. Using a kind of spiral star structure (Figure 9) instead of a pentagon, we can easily distinguish them. I have invented the structure expanded into unlimited plane, called "STAR CAGE 五勾(GO-MAGARI)" (1990). It stands by itself as a five-fold planar structure.

To make a six-fold structure with the spiral star structure, we can see the planes, which are constructed with "GO-MAGARI", quasi-periodically intersect one another (Figure 11, 12). The spiral star structures support each other at straight lines.

The regular dodecahedral, or regular icosahedral symmetry and size of the structure is defined based on the straight lines.

There are four solid-heterogeneity. Like "GO-MAGARI", this three-dimensional structure will be expanded into unlimited quasi-crystallized network. This reminds me of plexus — tissues of brain, I call this system a "HEXA-PLEXUS".

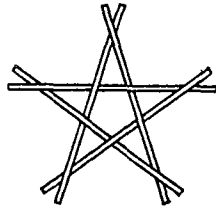


Fig. 9. SPIRAL PENTAGRAM

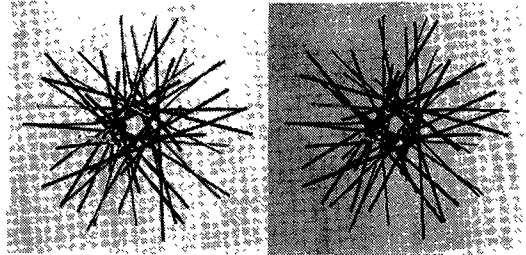


Fig. 11. An unit of HEXA-PLEXUS

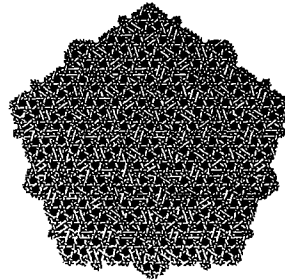


Fig. 10. STAR CAGE 六勾 (GO MAGARI)

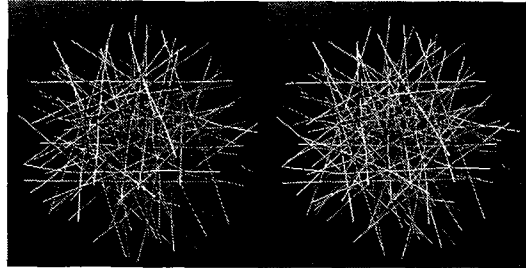


Fig. 12. HEXA-PLEXUS

I presented a solid structure called "STAR CAGE 六勾 (MU-MAGARI)" in 1993 (Figure 13). This quasi-periodical model was made by innumerable rods. Note that a "Penrose Weaving", presented by someone else, has a similar structure as "MU-MAGARI". Like "MU-MAGARI", "HEXA-PLEXUS" will also provide a new vision for quasi-periodical models

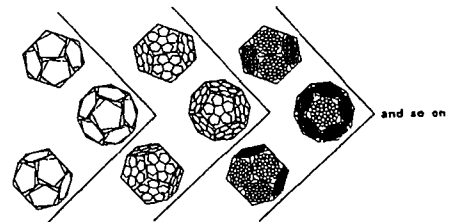
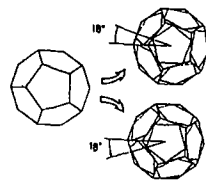
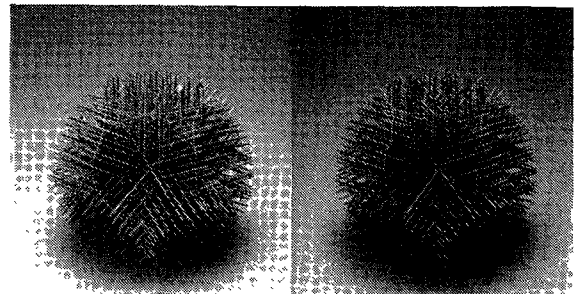
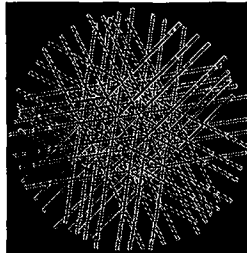


Fig. 13. STAR CAGE 六勾 (MU-MAGARI)

●PLEIADES

I made a small work called "昴 (subaru) = pleiades", with six pentagrams (Figure 14). Like the Great Bear, the pleiades have been popular since old times

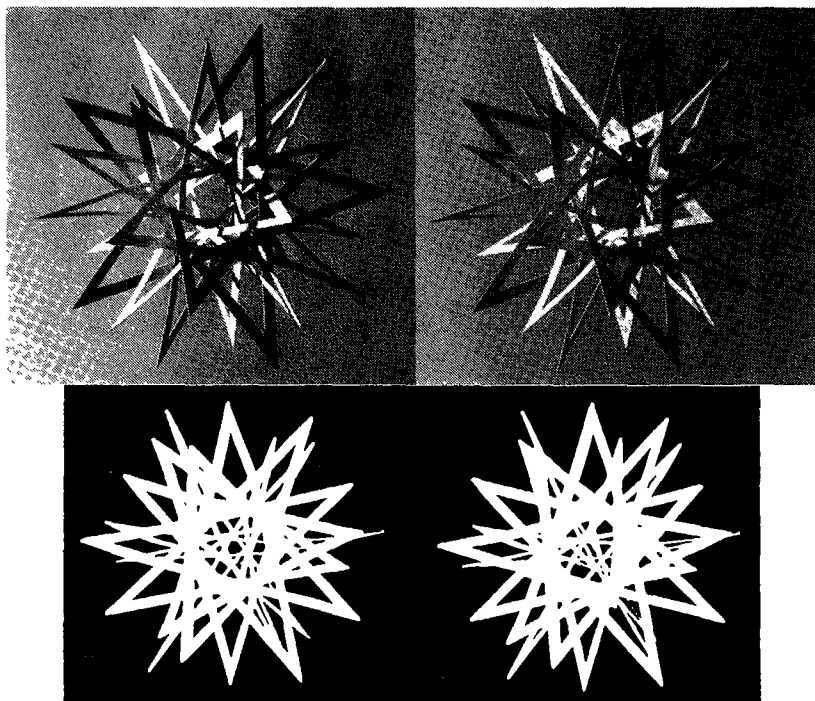


Fig. 14 PLEIADES

●DECA-PLEXUS

The "Poly-link" by A. Holden (Figure 10) is constructed with ten triangle frames. It can be transformed like our "HEXA-PLEXUS". It must be a ten-fold structure like Figure 16. So it might be called DECA-PLEXUS

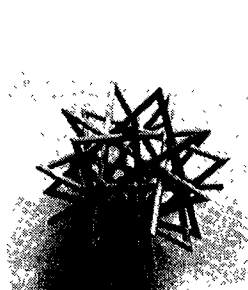


Fig. 15 The POLY-LINK by A. Holden

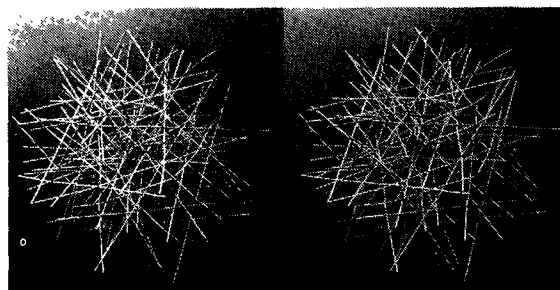


Fig. 16 DECA-PLEXUS

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