

Symmetry: Culture and Science

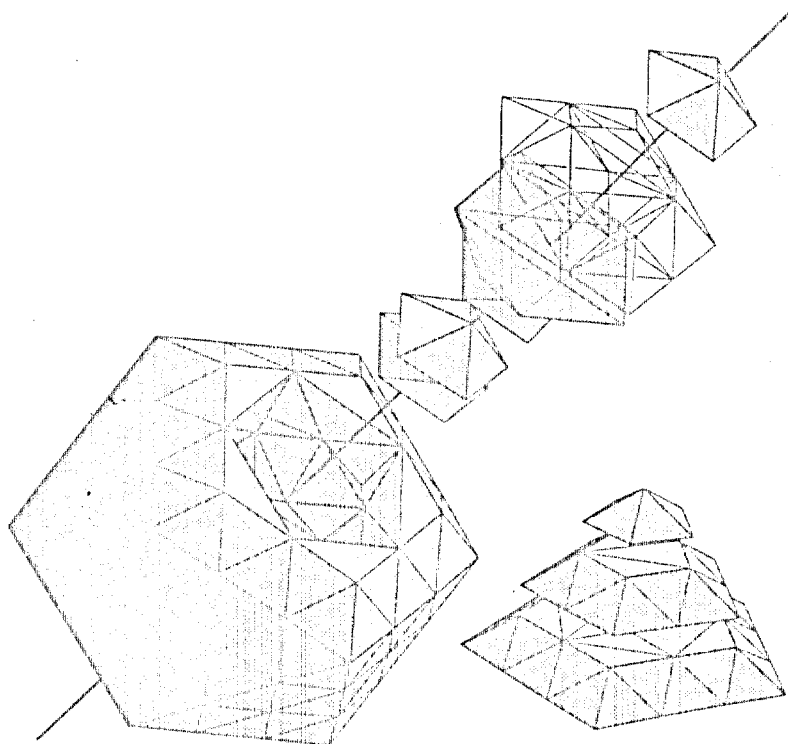
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Symmetry of Patterns, 2

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EVOLUTION OF ORIGAMI MODELS

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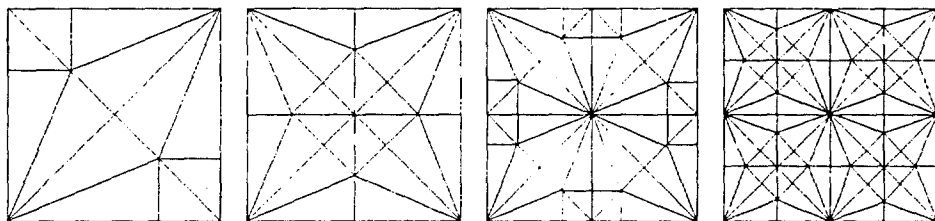
1. Orientation

At all times, my greatest interest in origami(paper-folding) is to create original models. Fold lines analysis, theorems about them, taxonomy,... These are entangled topics on the way to create new models. This report is one of such rutted roads.

2. Origin

Nobody knows who created traditional origami models. Traditional models are results of historical selection over 1000 years. We can compare it to biological selection. In this analogy, most important question is expressed as follows. What is selection pressure? In order to answer this question, I think another analogy between origami and biology. That is anatomy. We can find "clane series" as typical case of anatomical approach. "Clane" is representative traditional model. We have many "clane" based models. Marrow pattern of "clane" is folded up to flat form under stable (little stress) state. And, this pattern has sphere phase as a result that edge of paper is fitted to another edge.

"Clane base" is a member of "clane series" like binary system.



Fish base

Clane base

Flog base

Beetle base

(Fig. 1) Clane series

3. Organ

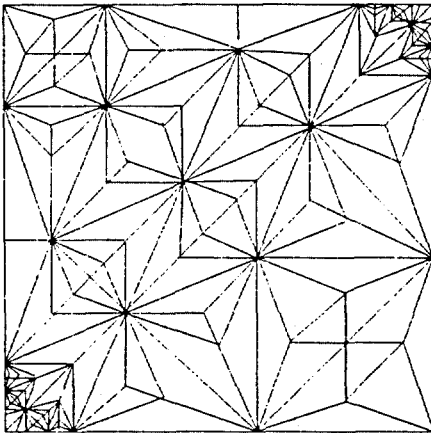
Fundamental region of "clane series" is a right-angled isoscales triangle. We can subdivide this triangle into two type triangles. These two triangles are elementary units of "clane type origami".



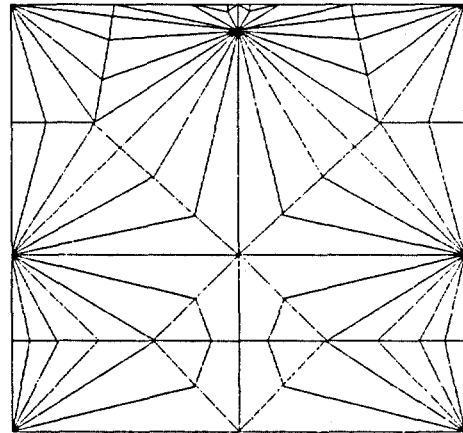
(Fig. 2) Fundamental region of clane series Elementary units

4. Origination

We can regard "clane type origami" as a conditional tiling work using the elementary units. I can get many models by the tiling work (Example: Fig. 3) These elementary units are $90/4$ degree base. We can extend them to $90/3$, $90/5$, and $90/6$ degree based pattern. (Example: $90/6$ degree pattern: Fig. 4)



(Fig. 3) Devil



(Fig. 4) Mantis

References

"Viva ! Origami"	Maekawa Jun	1983 ISBN-387-89116-5
"Top Origami"	Kasahara Kunihiro	1985 ISBN-387-85096-5