

PINO TROGU – SAN FRANCISCO STATE UNIVERSITY, USA

BIO-INSPIRED MODELS OF ROTATIONAL GEOMETRY

MODELS BASED ON GIORGIO SCARPA'S WORK
IN TOPOLOGY, BIO-INSPIRED DESIGN, AND ROTATIONAL GEOMETRY

TU DELFT – FACULTY ROOM (LAGERHUYSCH) AT 3ME
THURSDAY, 21 DECEMBER 2017 – 12:45 PM

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ORIGINS AND INFLUENCES

G. Scarpa

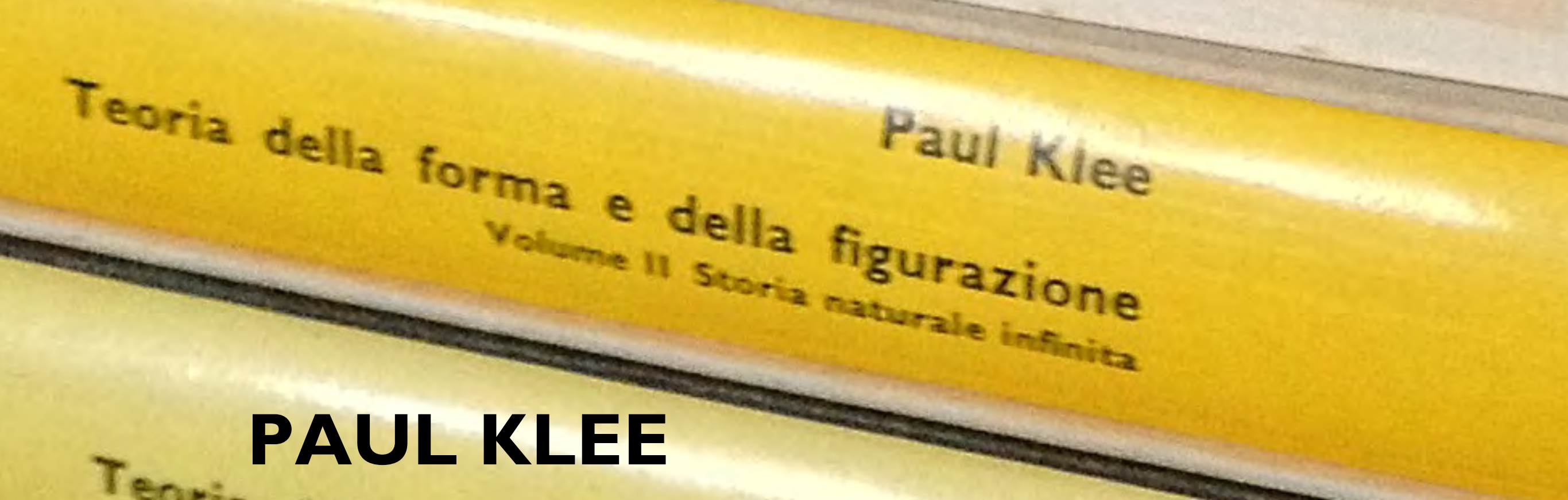
“Year 1950, my first project”



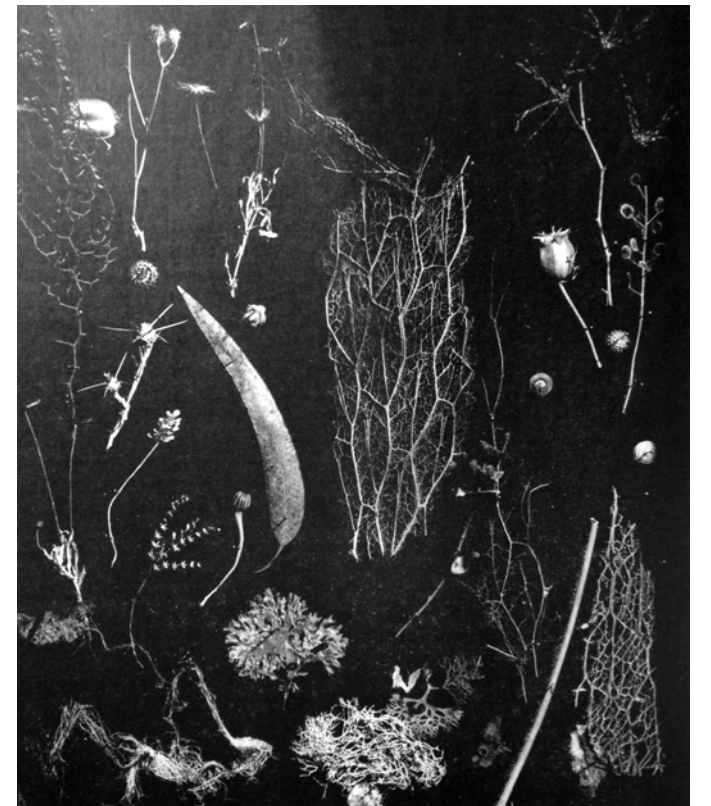






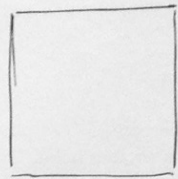


PAUL KLEE

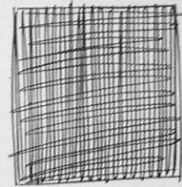


Body

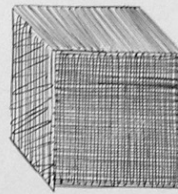
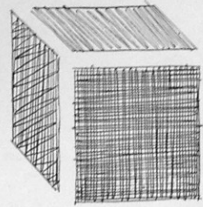
Body two-dimensional, marginal or middle (body-limit)



Body two-dimensional. External-material, active-planar (outer surface of a body)

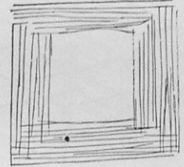


Body three-dimensional (body-outward)

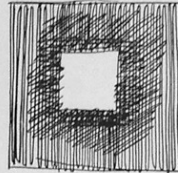


Spatial

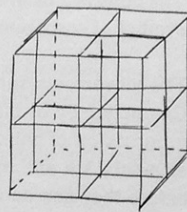
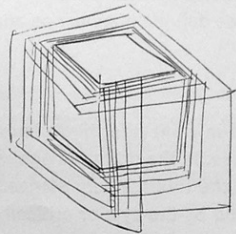
Spatial two-dimensional encompassing (activated passive)



Exotopic encompassing (without body)

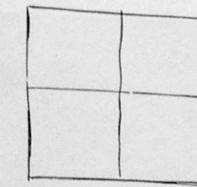


Spatial three-dimensional and transparent

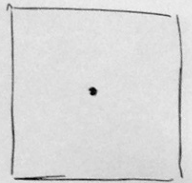


Inward

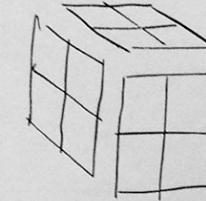
Inward two-dimensional (content)



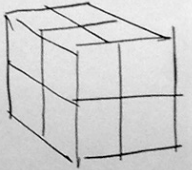
Most-inward (centre)



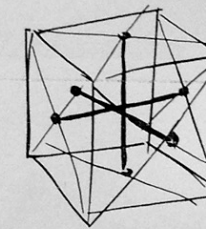
Inward two-dimensional, inward representation of outer planes



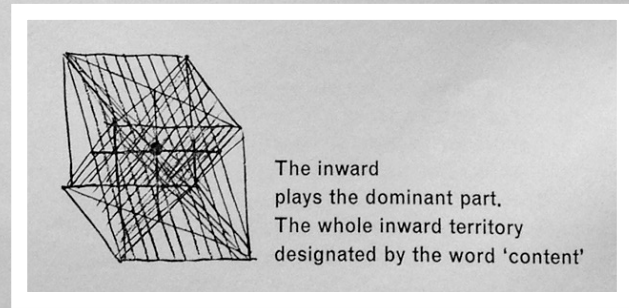
In contrast to the inside and outside of a body



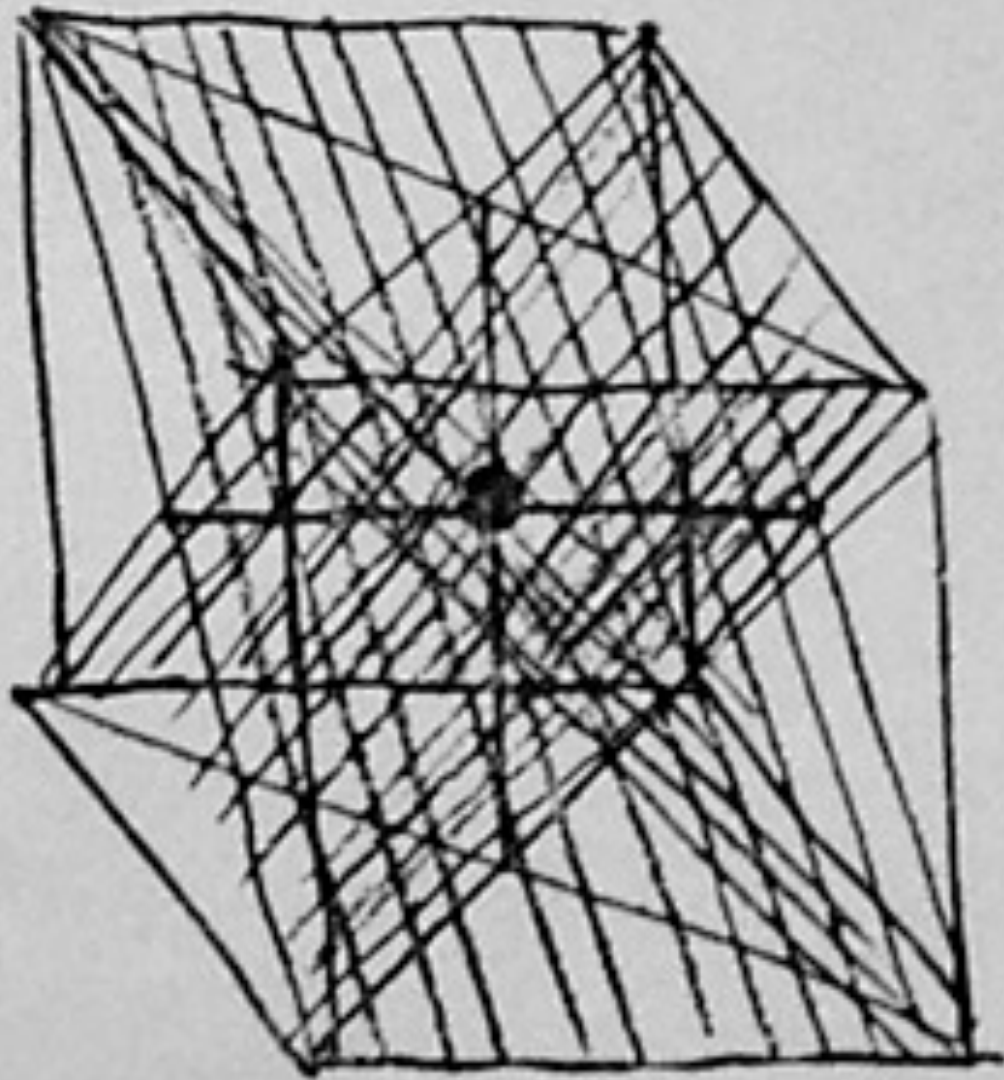
Inward three-dimensional, body inside



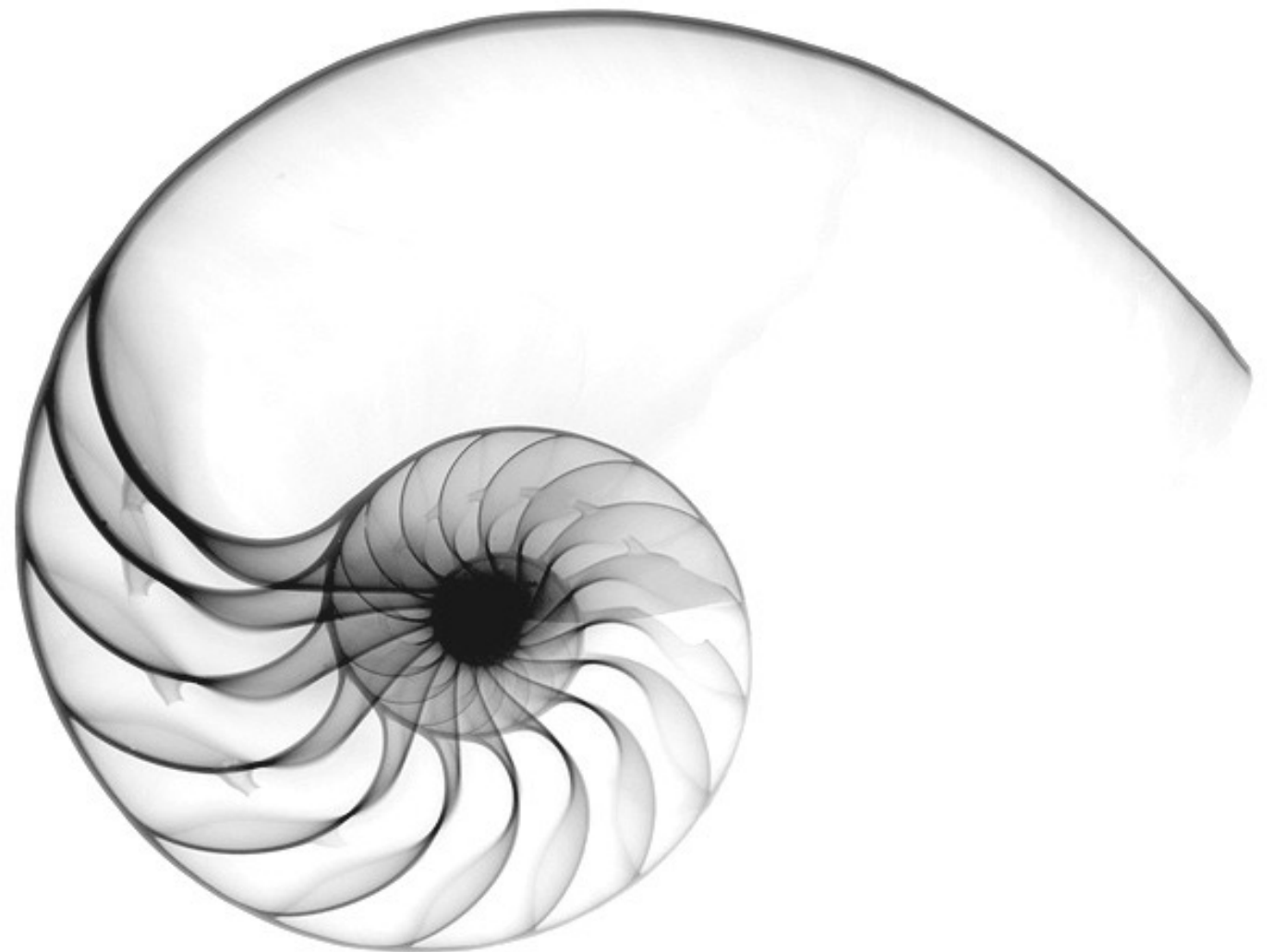
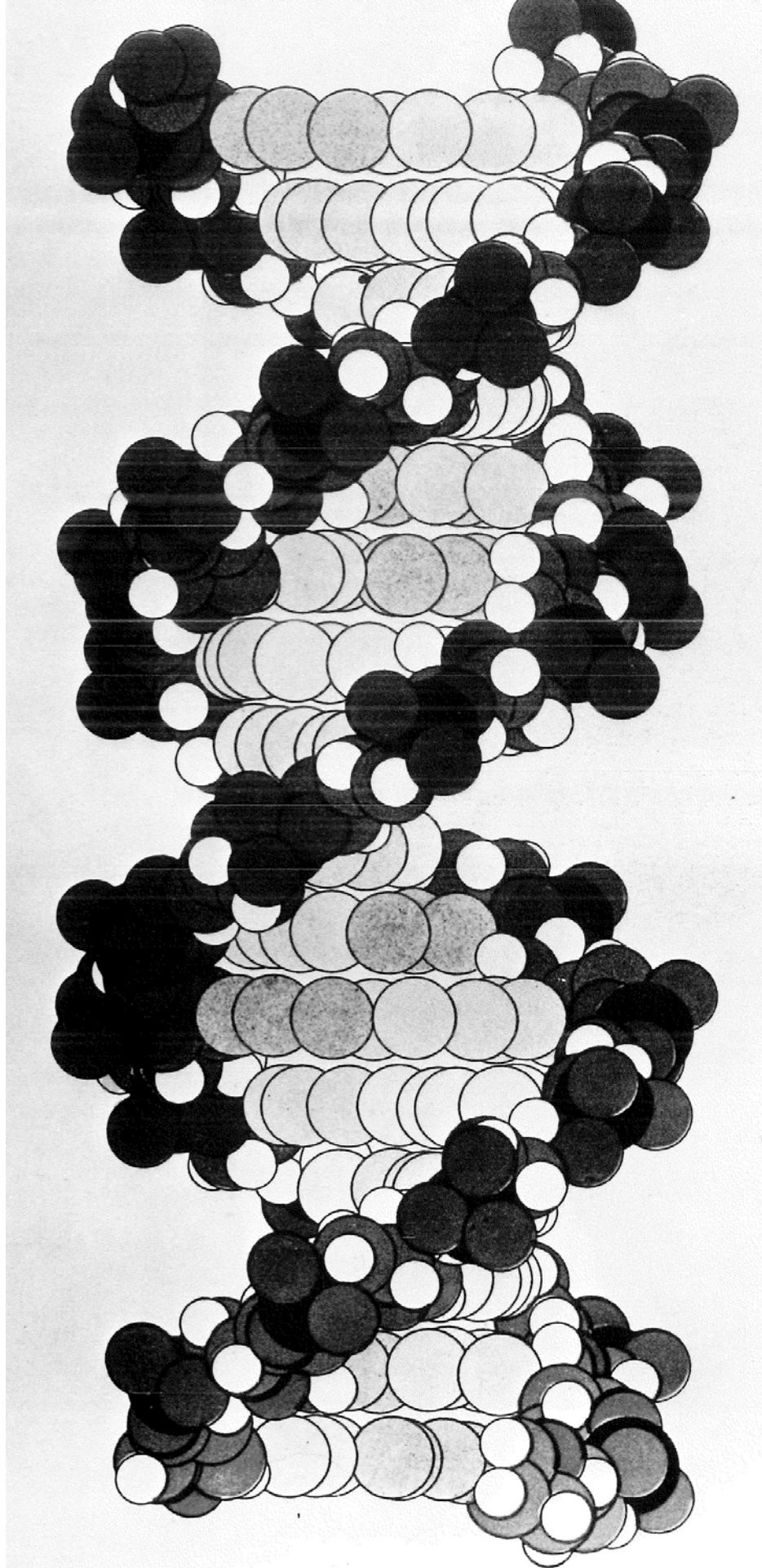
Purely inward, body innermost



The inward plays the dominant part. The whole inward territory designated by the word 'content'



The inward
plays the dominant part.
The whole inward territory
designated by the word 'content'

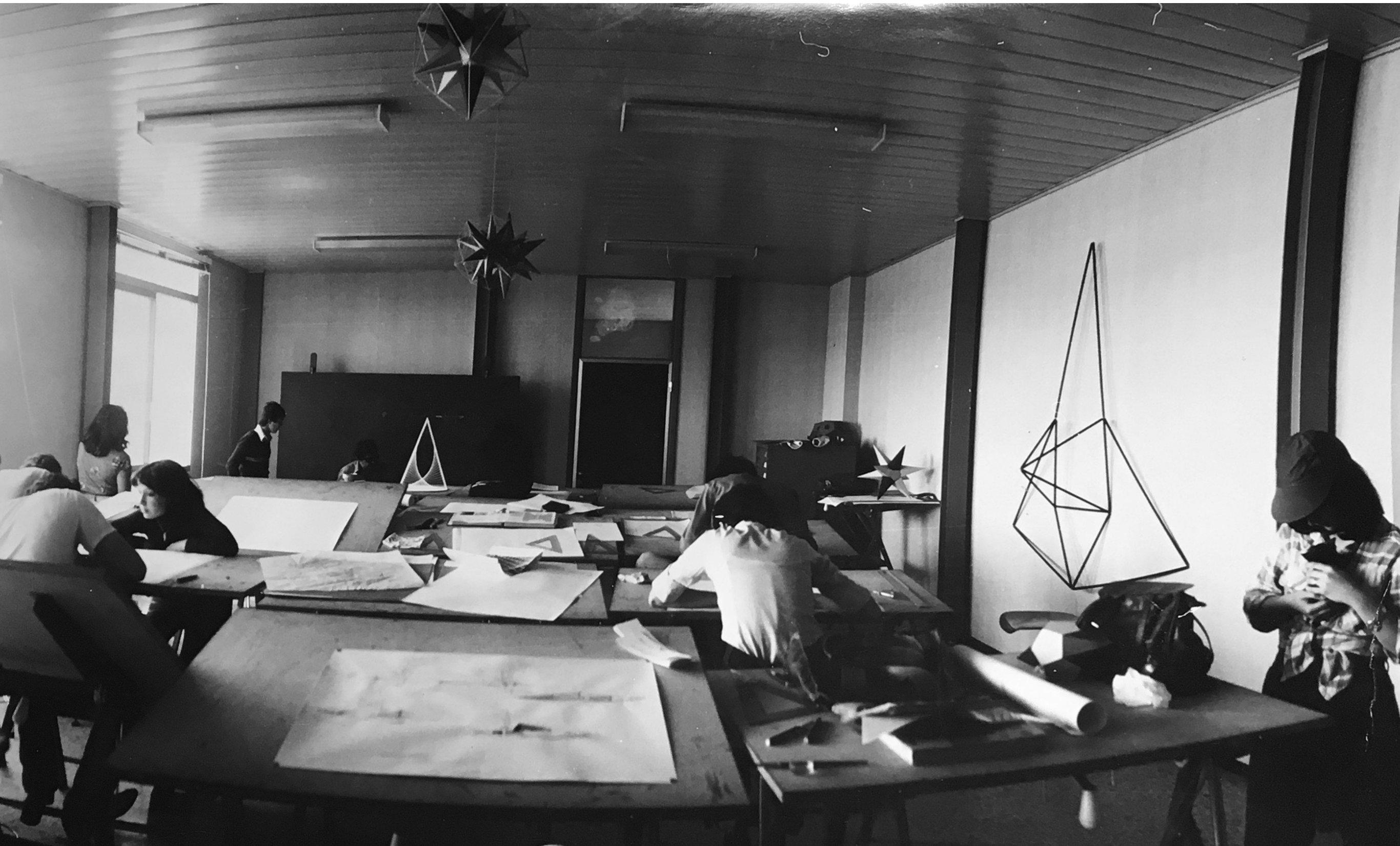


“If you are going to do research in bionics, don’t forget to study seeds, for the knowledge that nature displays in their creation, and for the originality and unpredictability of some of their self-dispersal mechanisms.”

Giorgio Scarpa, 1988

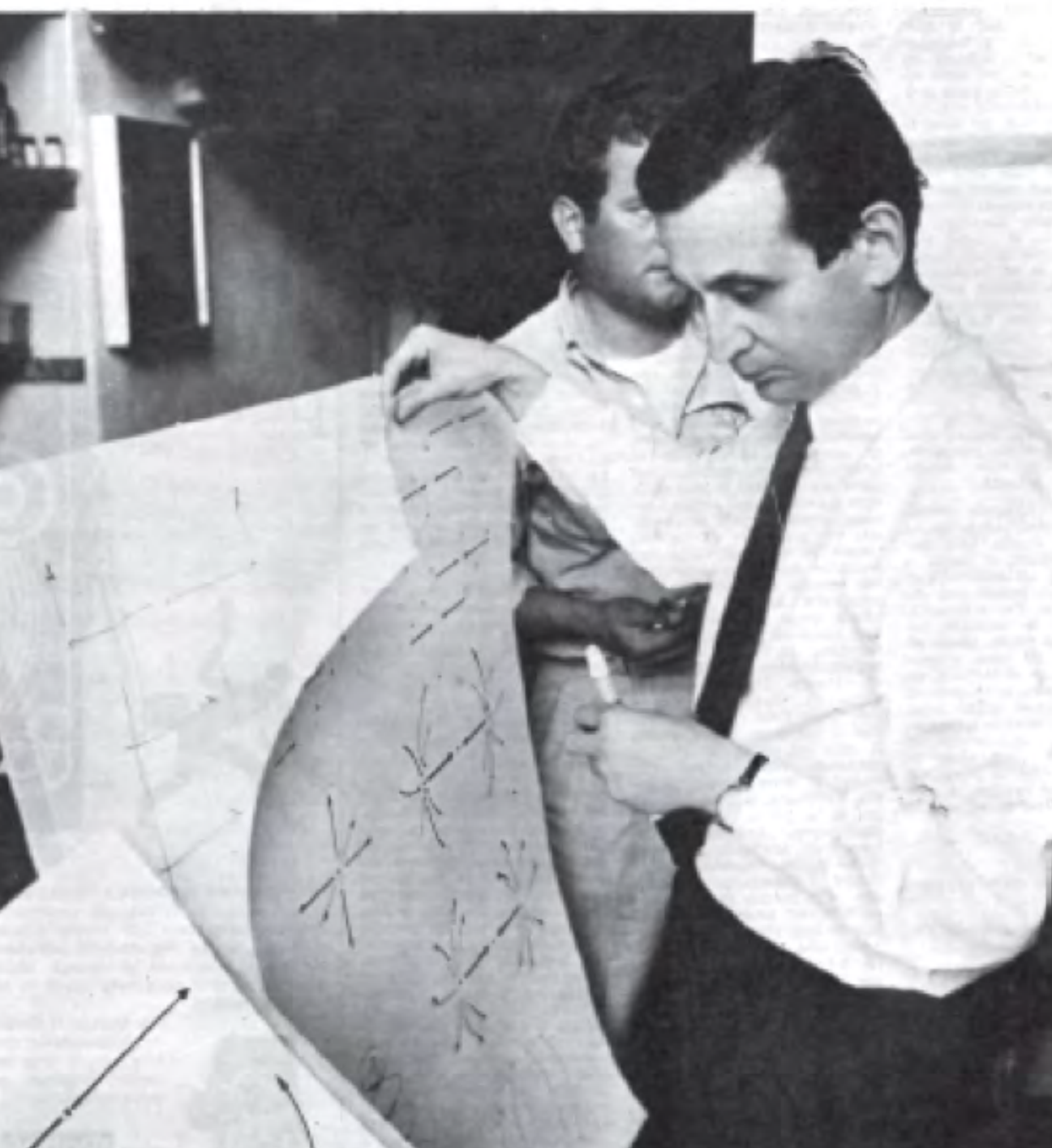


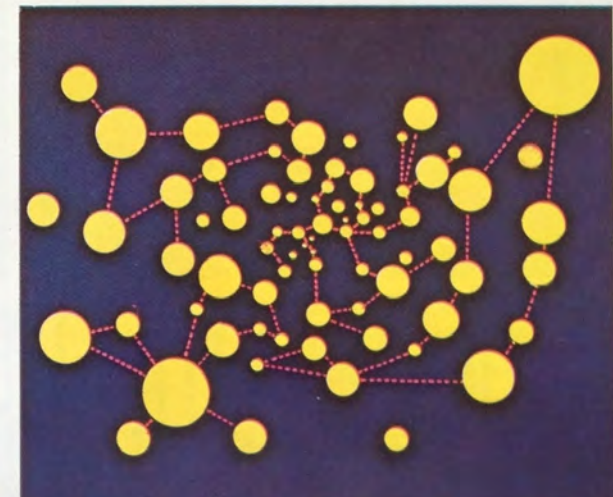
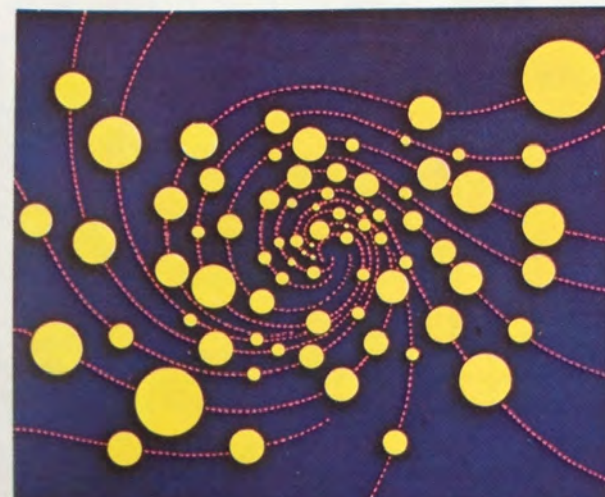
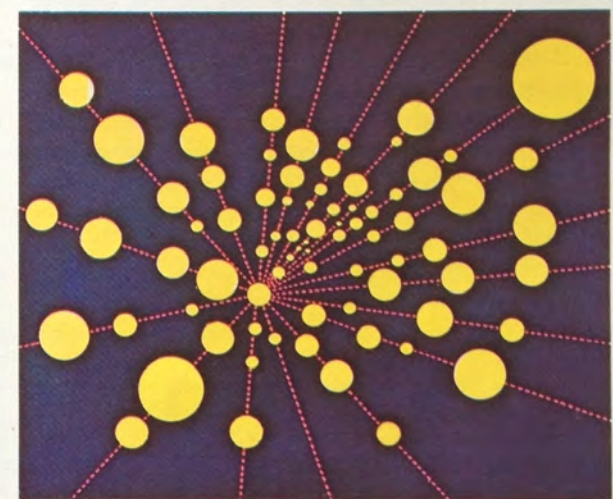
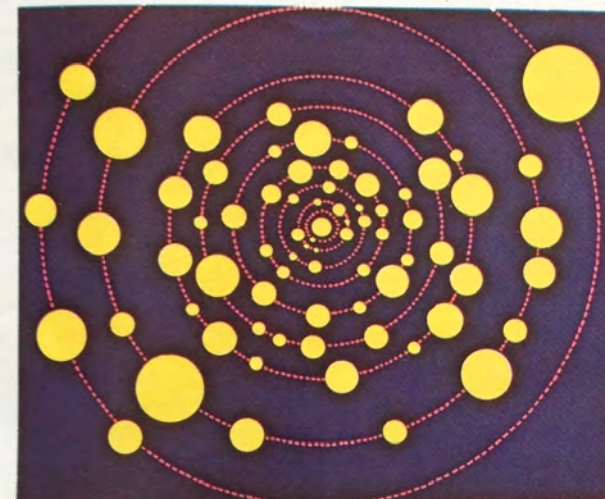
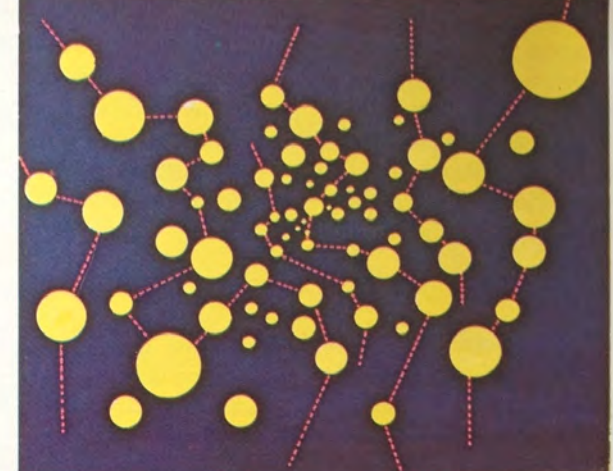
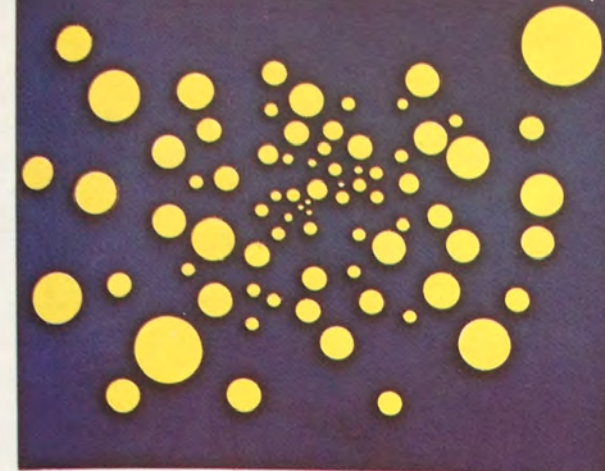
SCIENTIFIC AMERICAN



avviene nel cervello dell'uomo che esegue un disegno

La matita e la mente





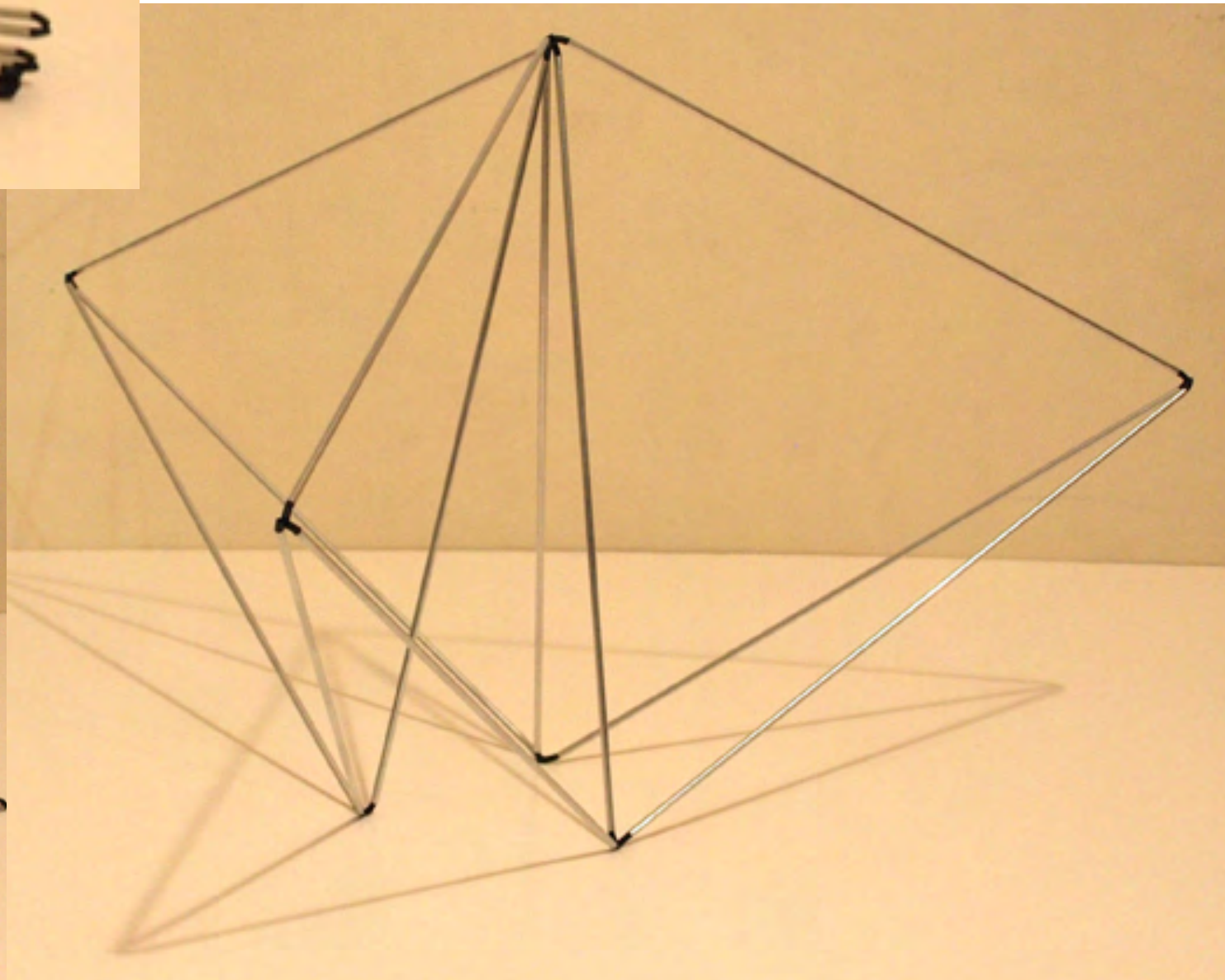
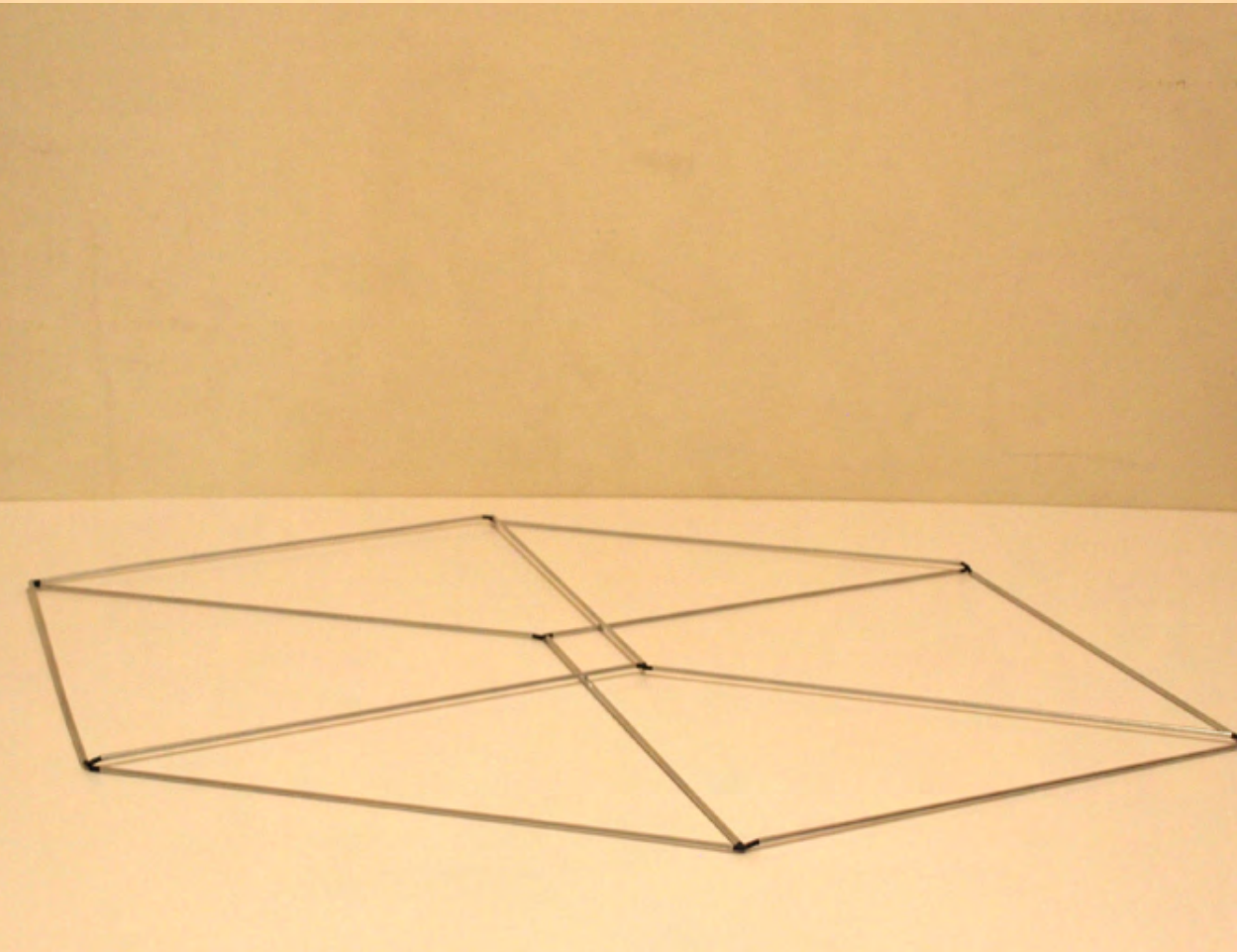
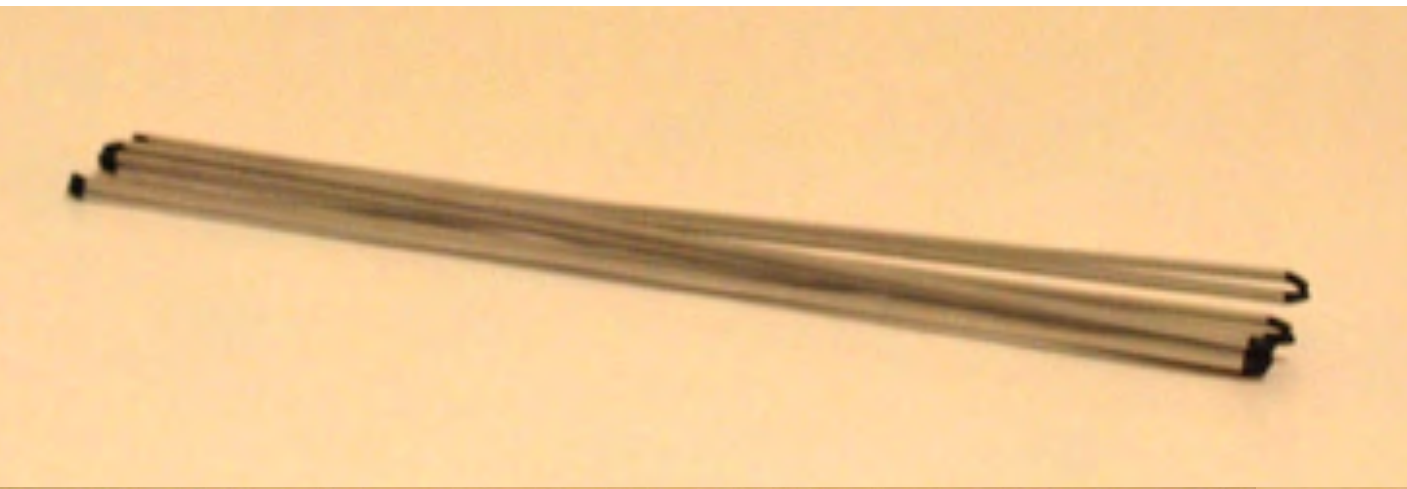
rimento possiamo vedere i dischi allineati lungo i raggi che partono da questo centro (fig. 33). Ed ecco apparire l'immagine di un universo che si « espande ».

Possiamo però stabilire altri collegamenti fra i vari dischi, formando, ad esempio, una struttura a spirale

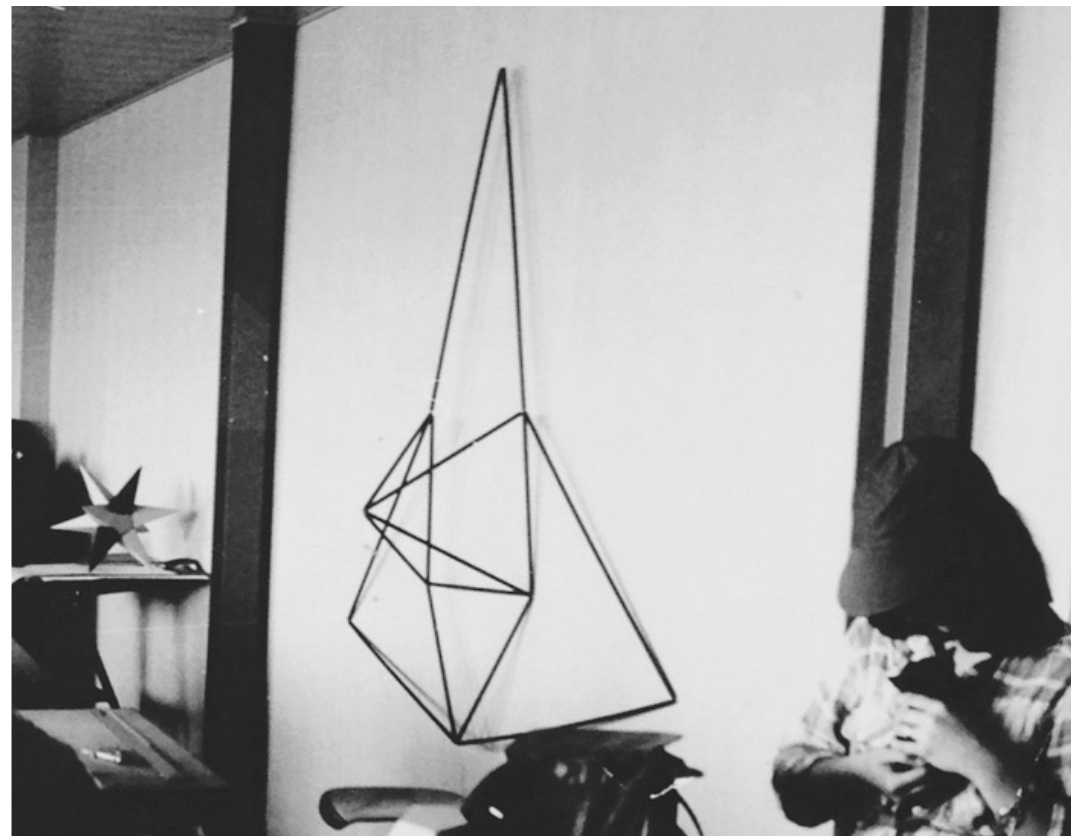
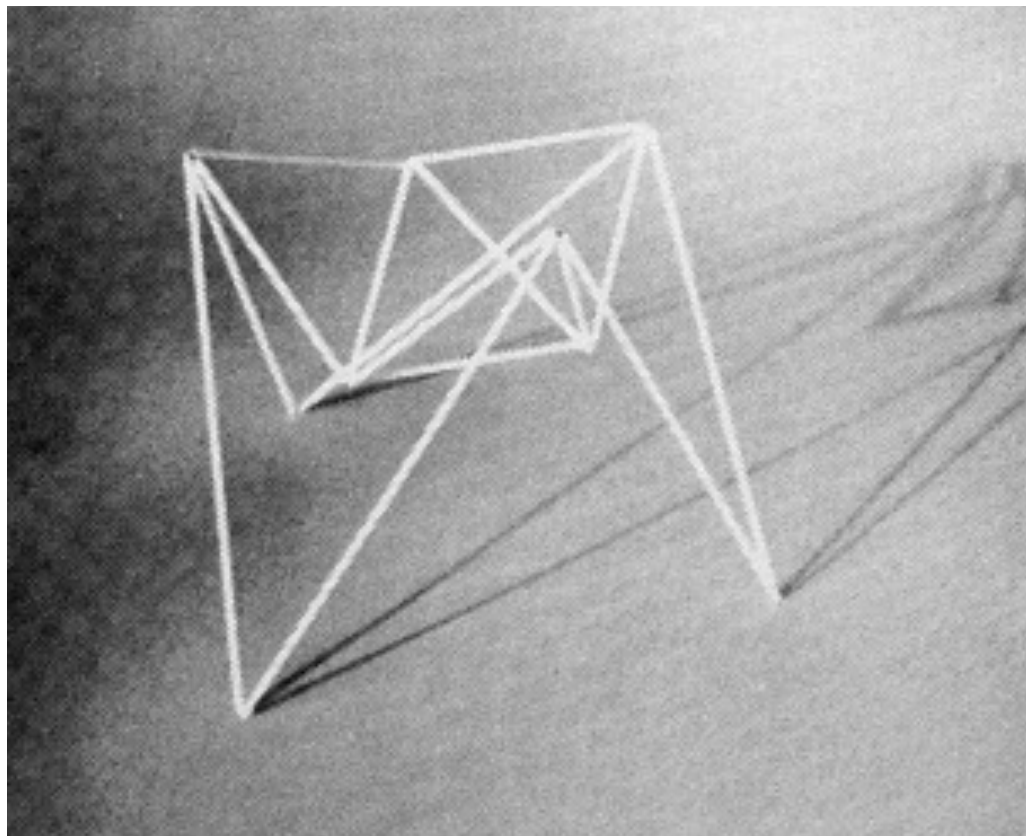
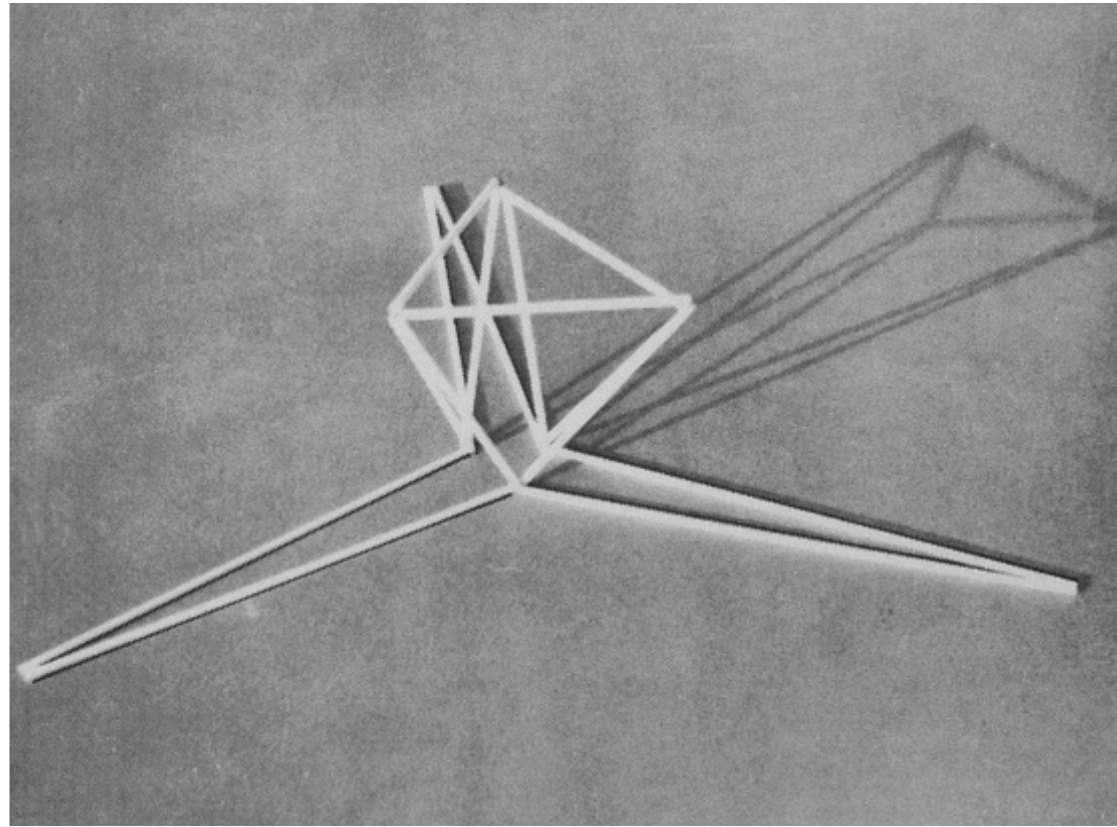
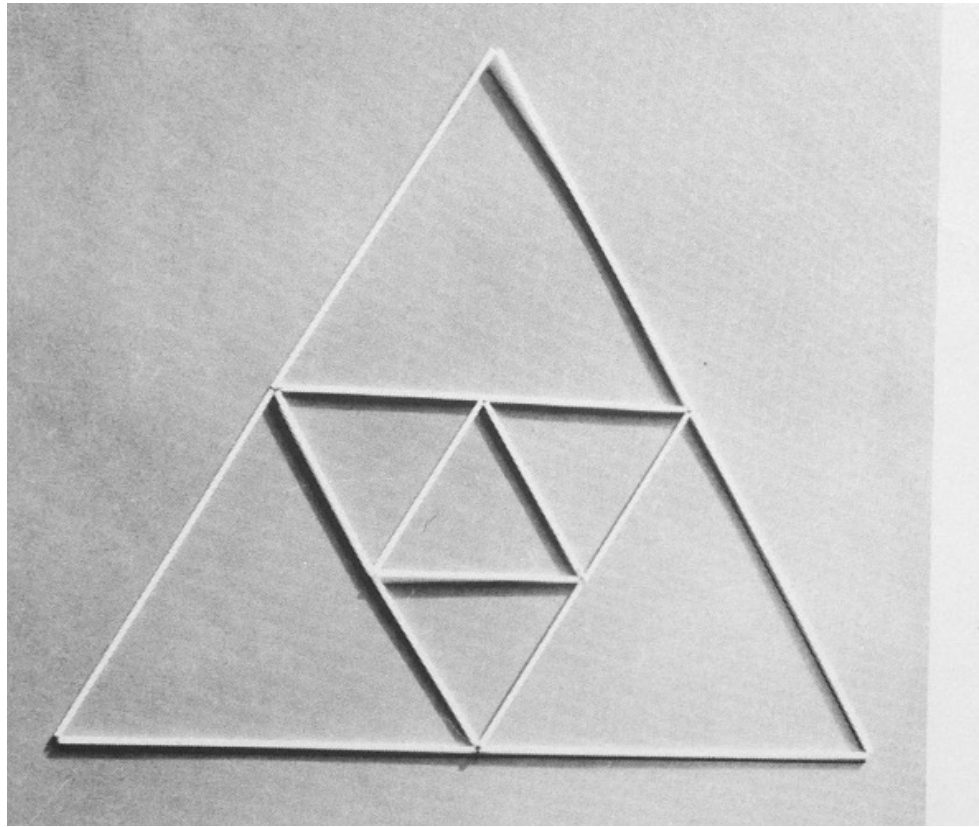
che ci dà l'immagine ormai classica delle galassie, di un turbine che trascina con sé i mondi (fig. 34). Oppure con la nostra immaginazione potremo isolare alcuni gruppi di dischi e organizzarli nelle forme di costellazioni fantastiche (fig. 35).



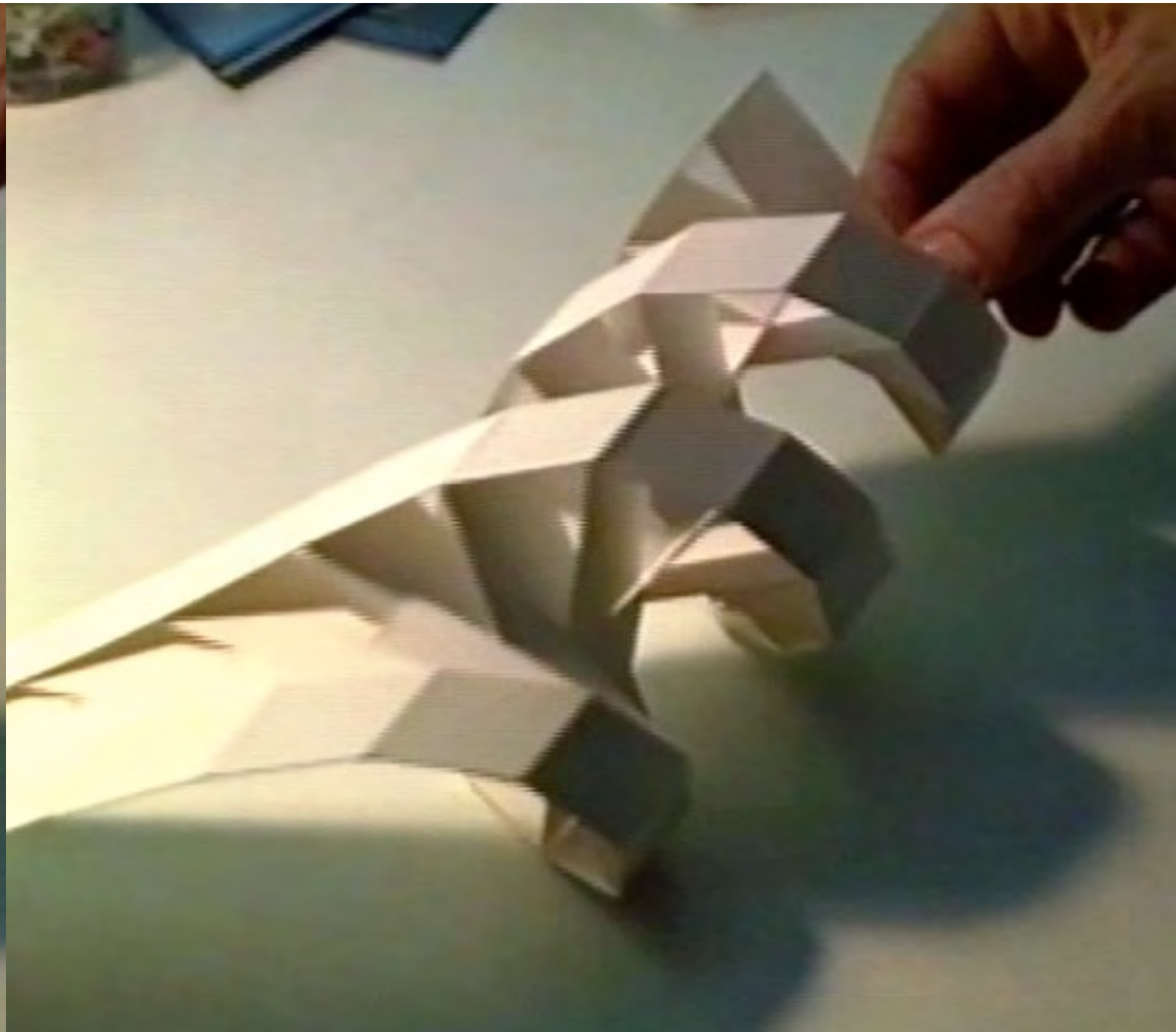
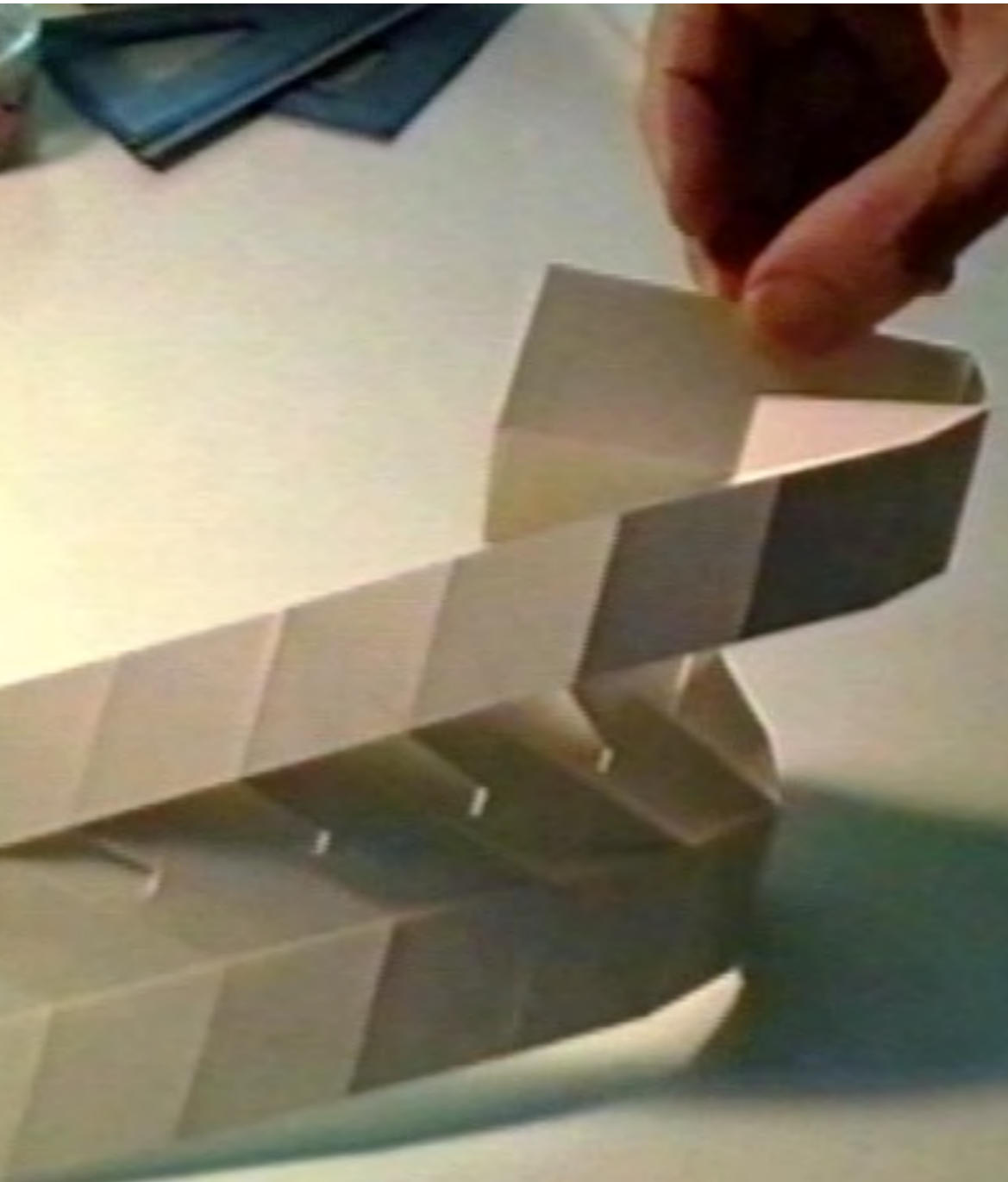
TRANSFORMABLE CUBE , 1965.



TRANSFORMABLE TRIANGLE , 1965.



DNA MODEL, C. 1985.

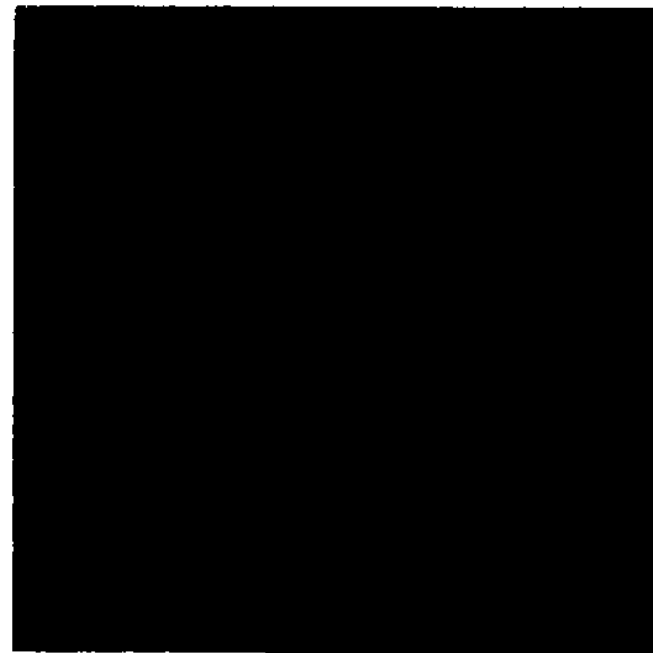
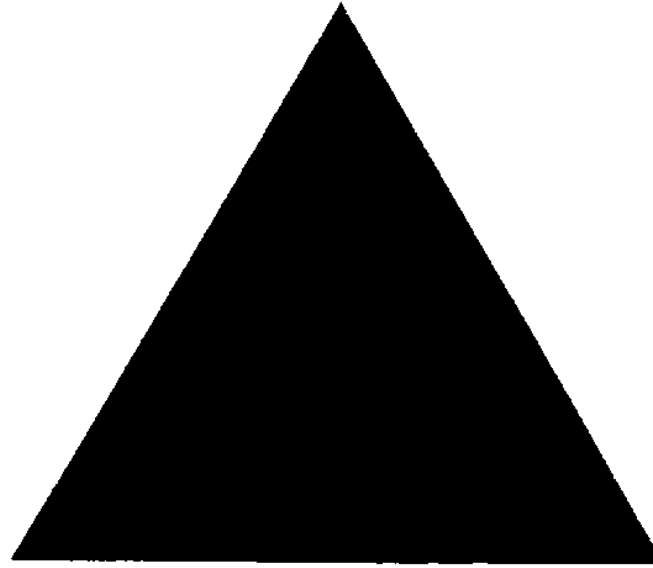


RESEARCH AND TEACHING

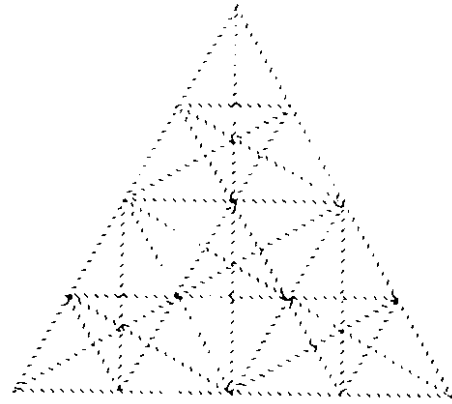
MODELLI DI GEOMETRIA ROTATORIA

I moduli complementari
e le loro combinazioni

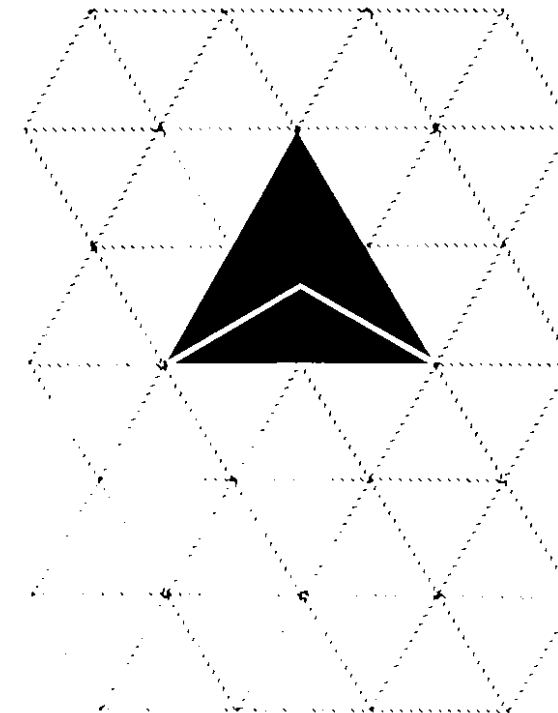
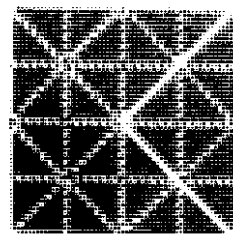
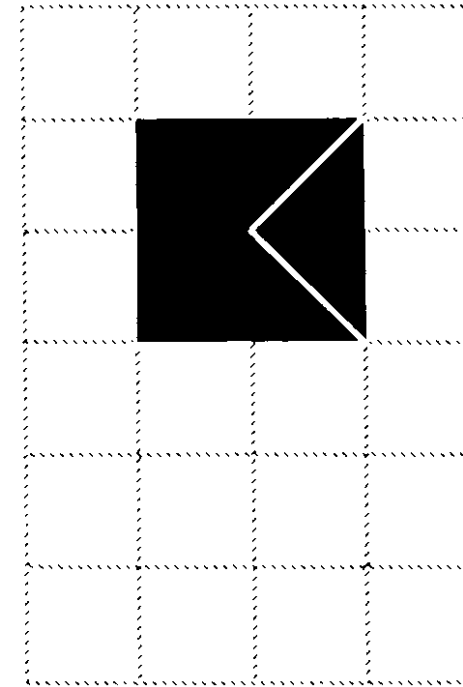
a cura di Giorgio Scarpa



The two basic forms.

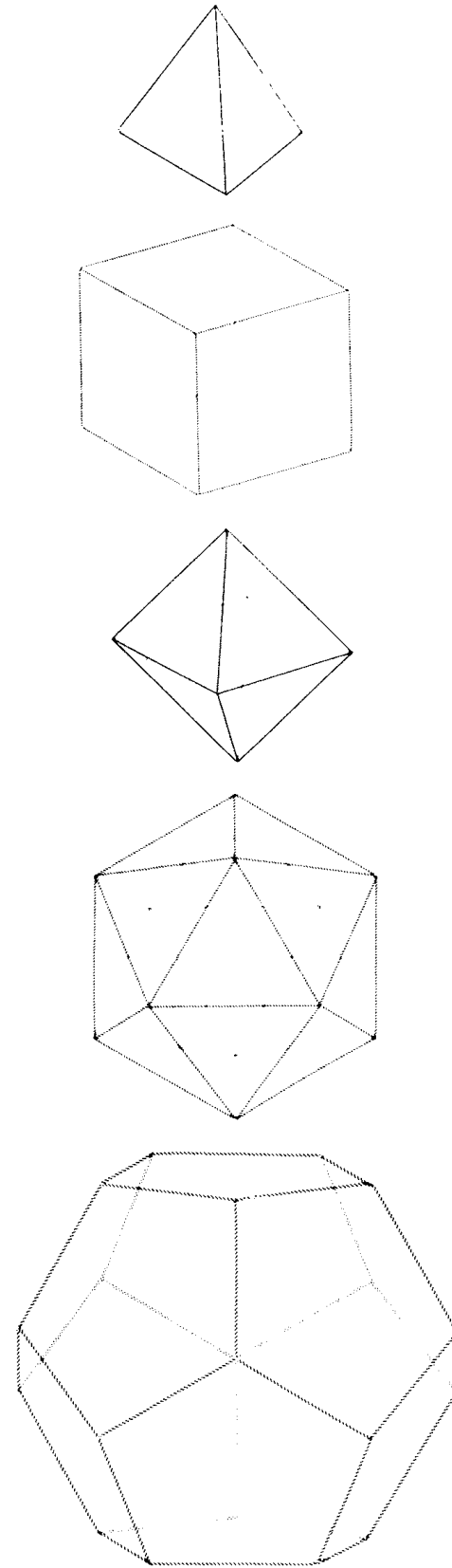


We will then put the two figures derived from the section of the square in a structure constituted of square modules, and the forms derived from the section of the equilateral triangle, in a structure constituted of equilateral triangles. The forms will be cut out of paper board and we will put them on the modulated surface. The sides of the figures must be the same or a multiple of the basic module that forms the structure.

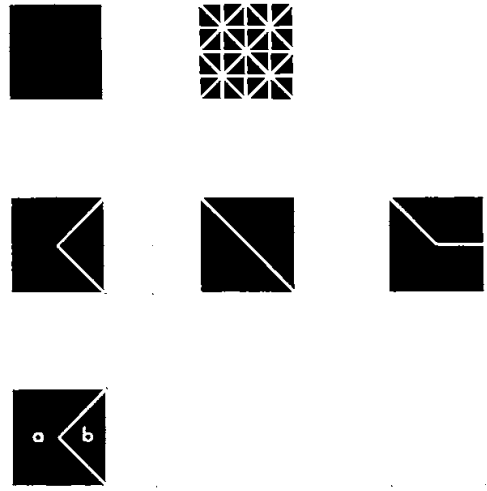


PLATONIC SOLIDS

(REGULAR
POLYHEDRA)

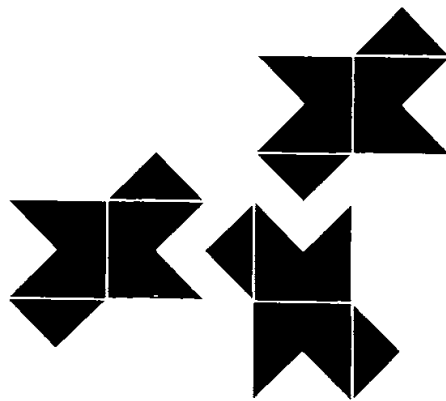
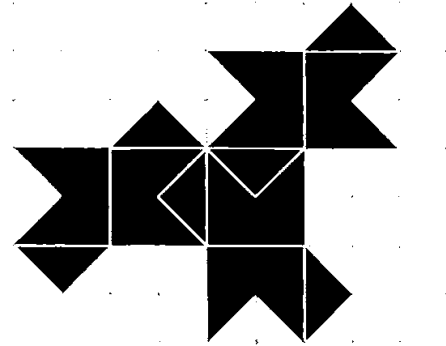
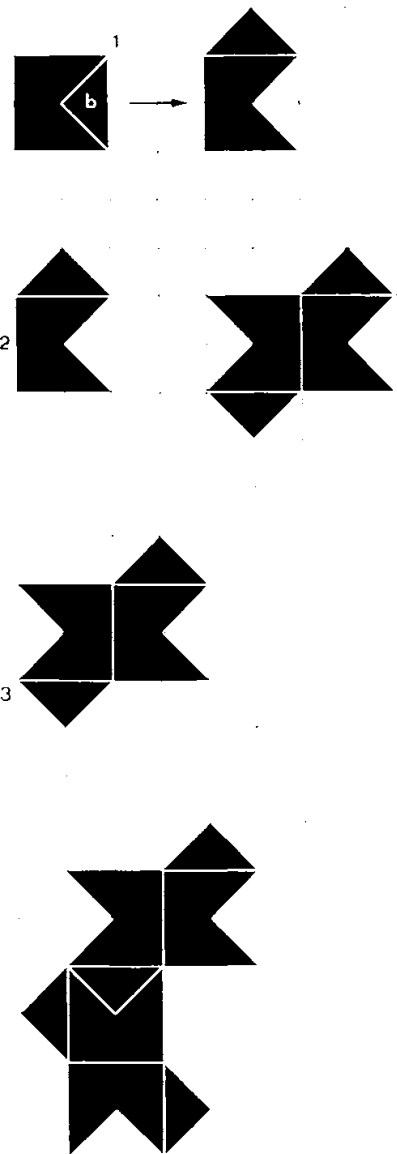


The five Plato polyedrons.



out) is defined by 4 rotations around 3 centers of symmetry, and is articulated in 3 distinct fold-out plane groups, each being constituted by two squares (4 parts). The first rotation transforms the bisected square, which has a specular symmetry, into a new figure that is no longer symmetric. Starting from this sequence, all the following ones show operations of cyclic rotatory symmetry.

2D → 3D



Geometric operations:

Sections

Rotations

Translations

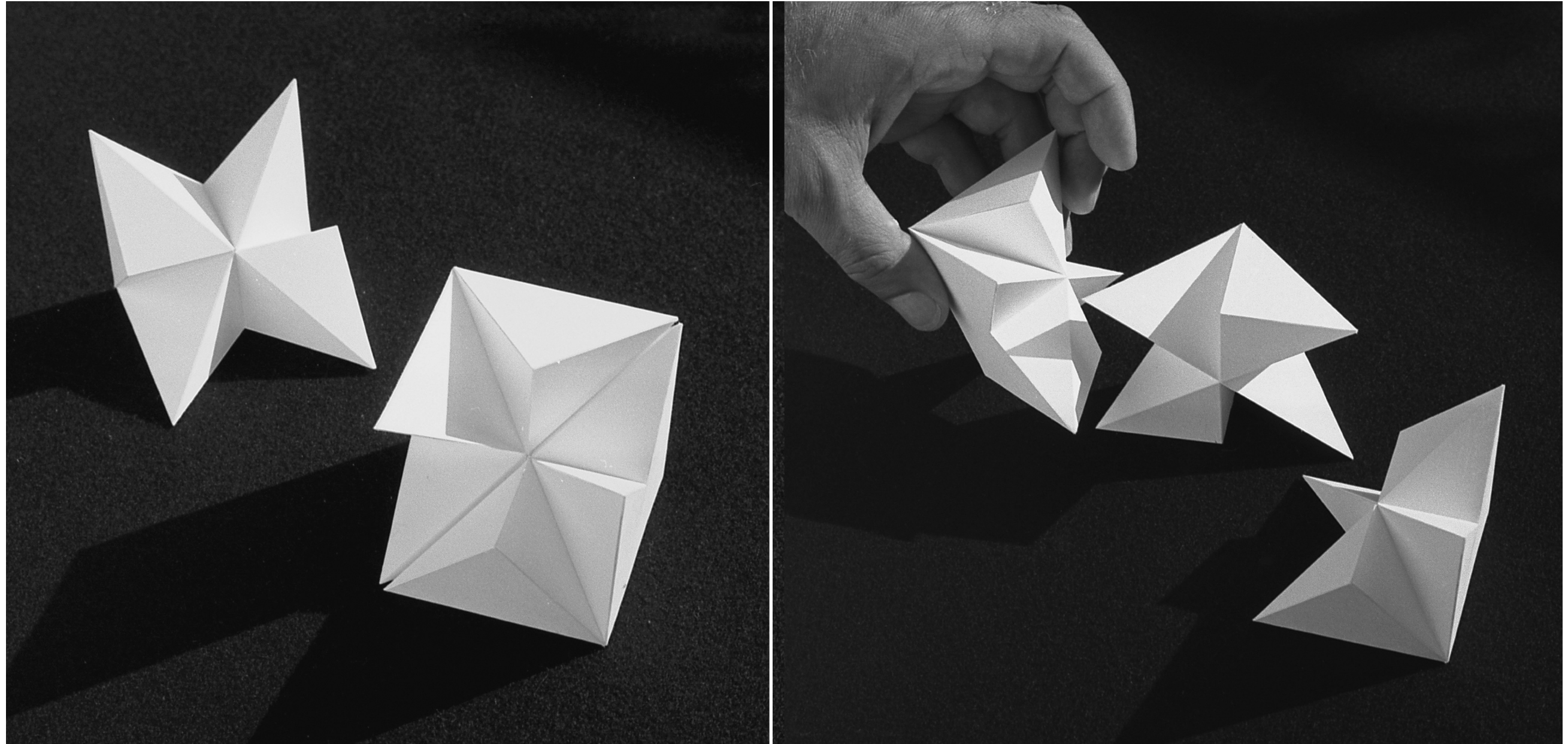
Flips

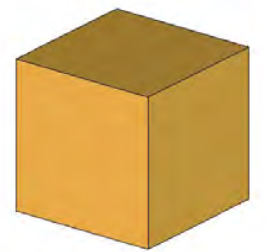
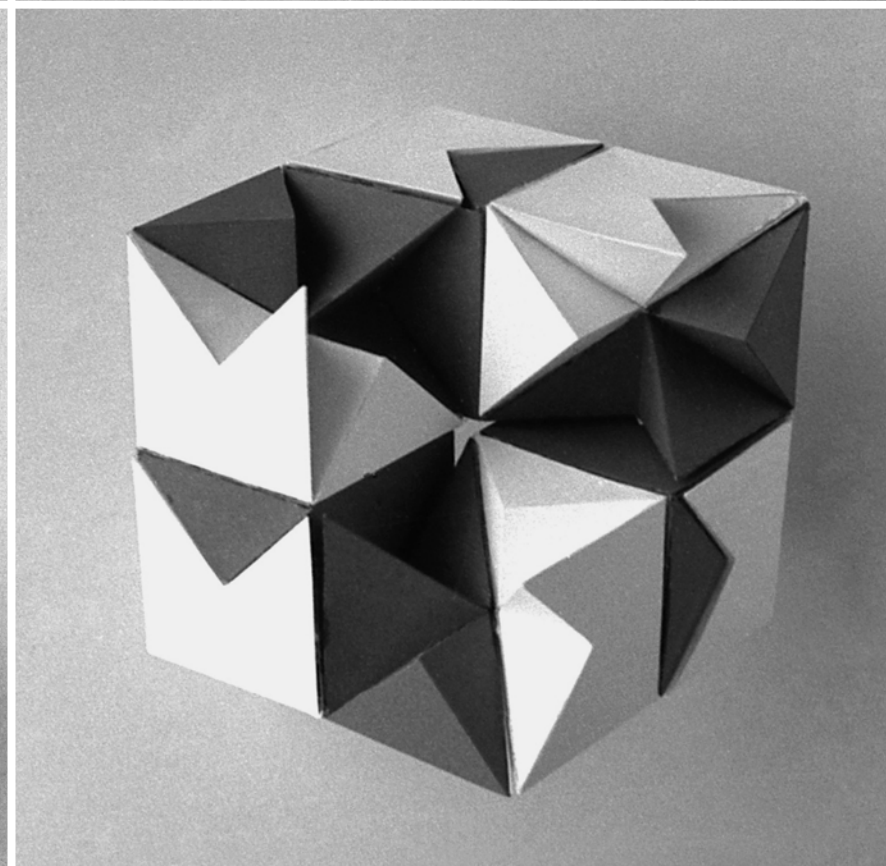
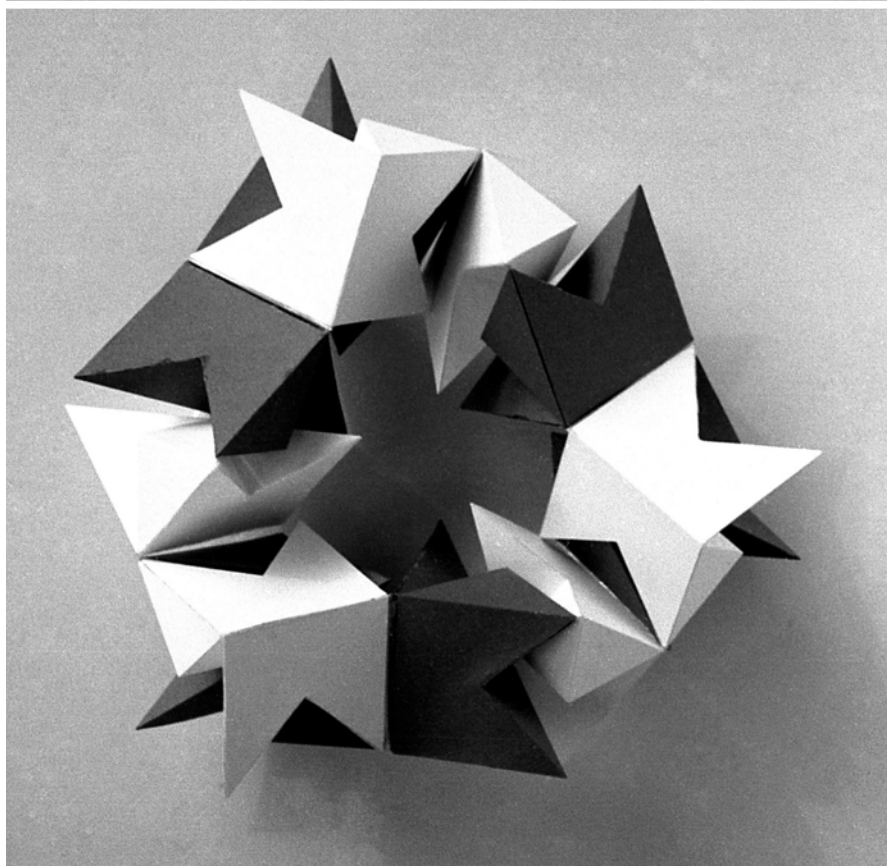
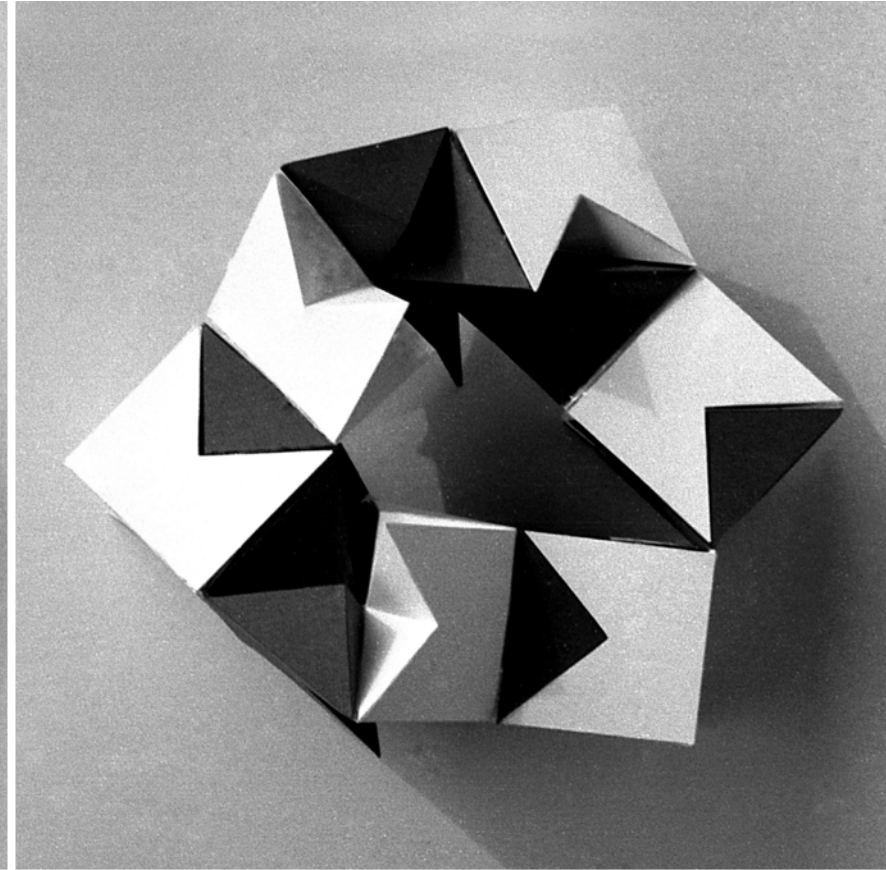
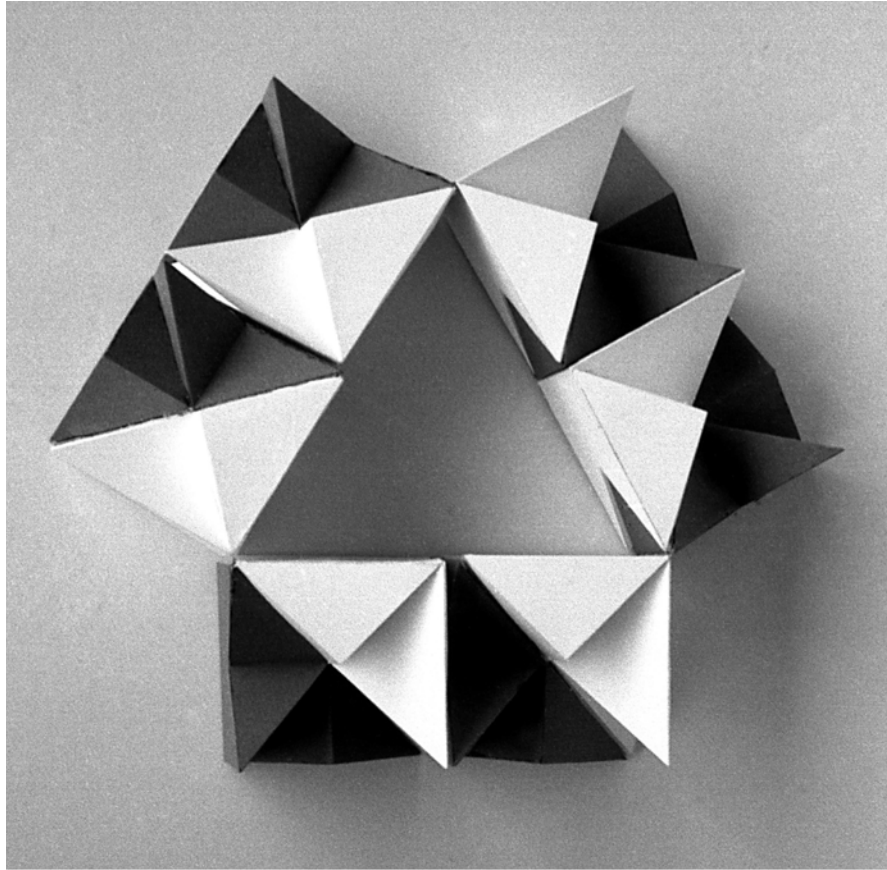
Foldings

Joining

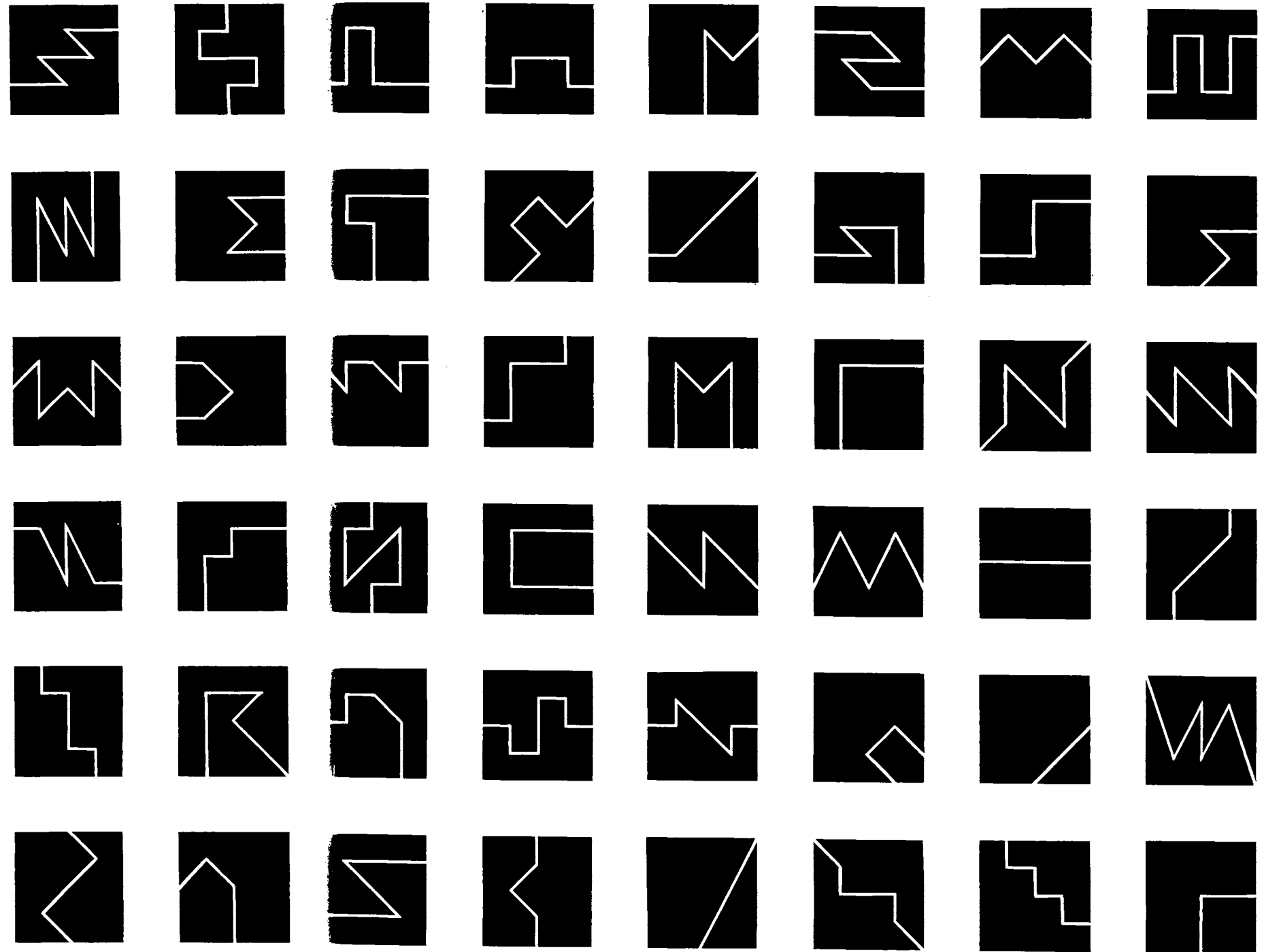
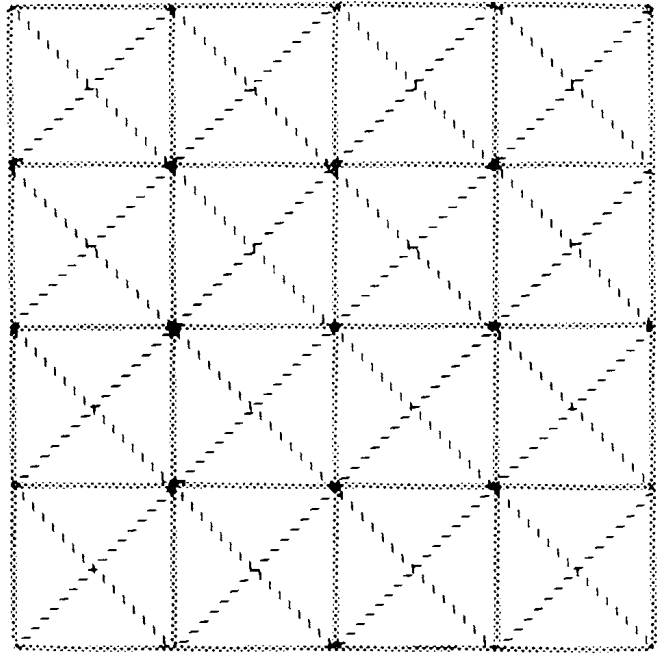
Hinges

2D \rightarrow 3D

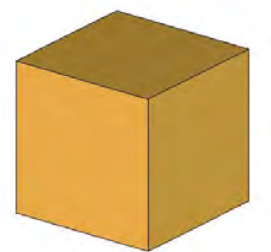
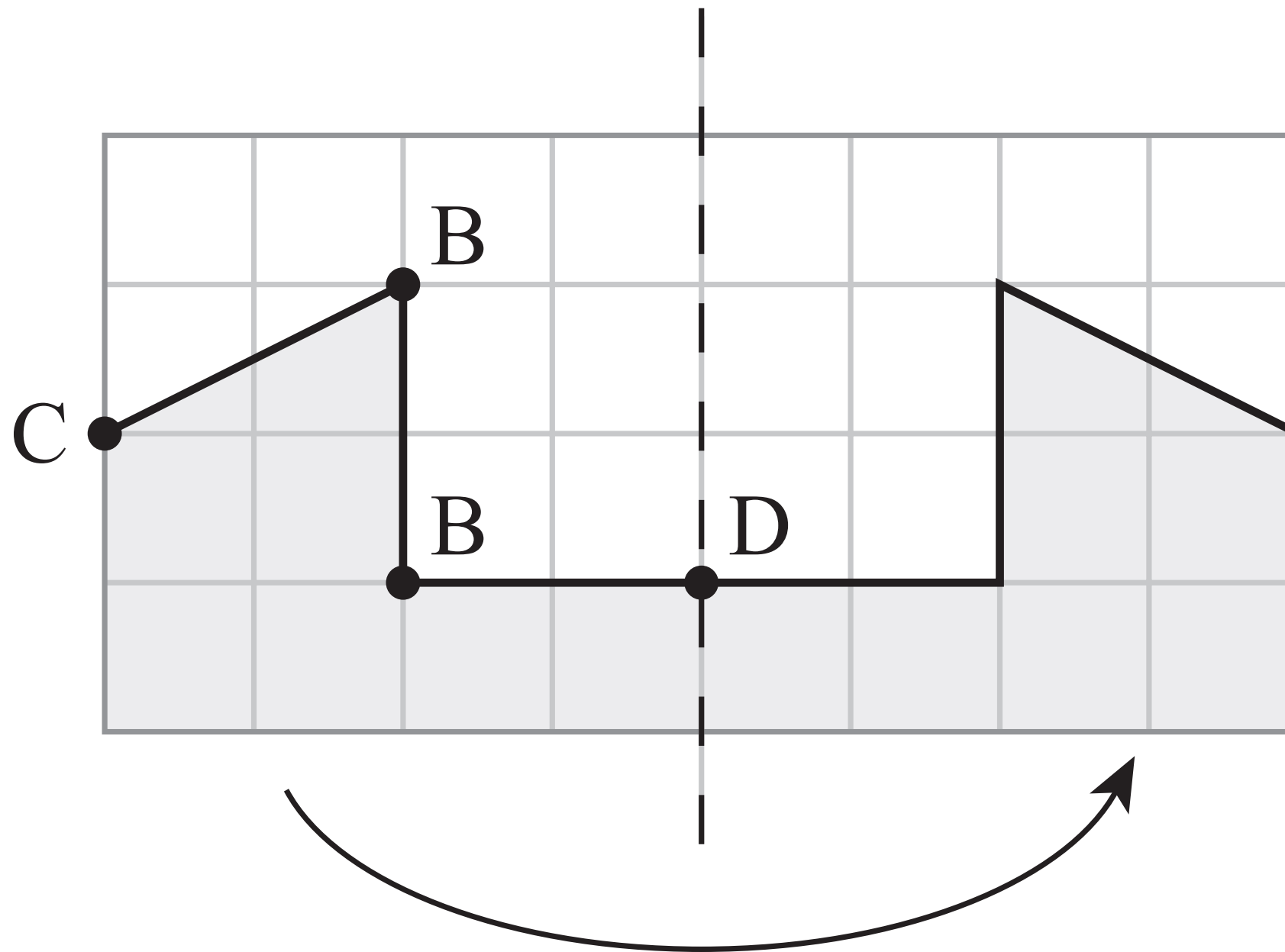




SECTIONS

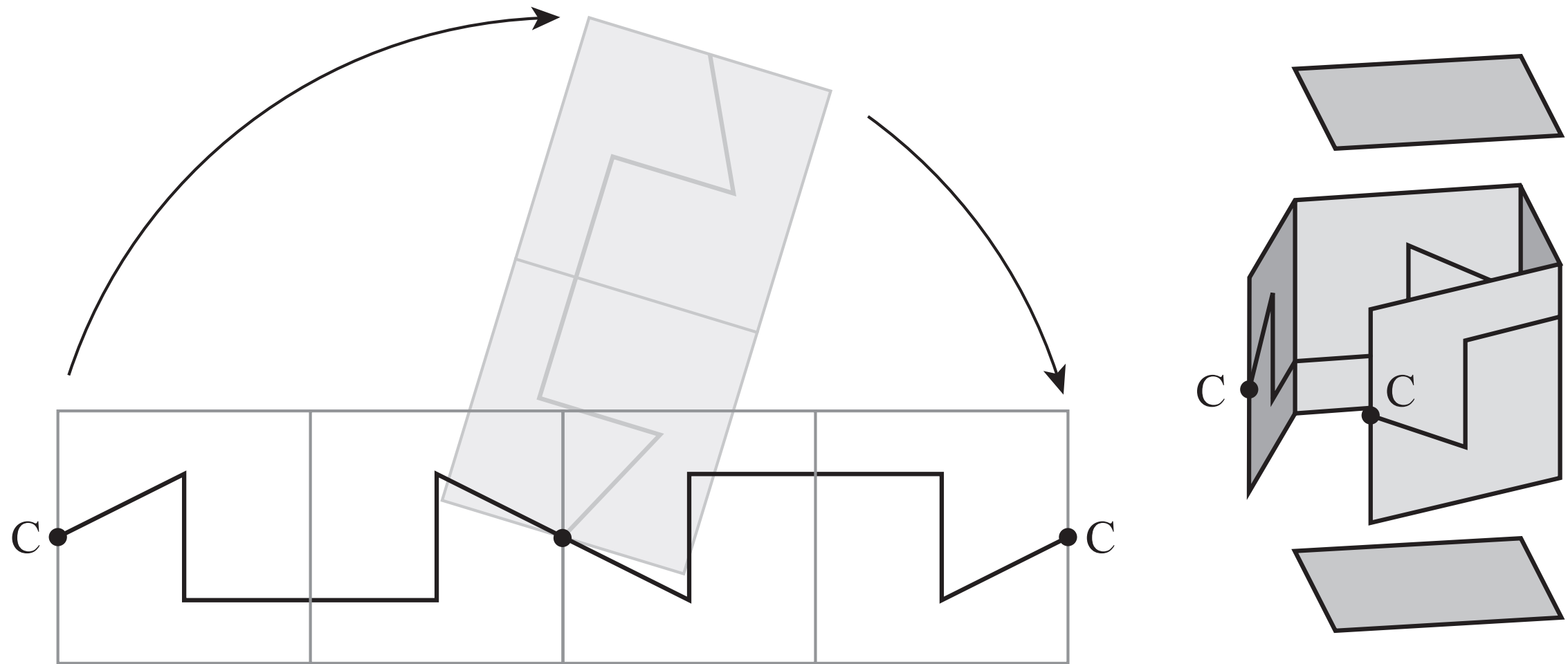


CUBE DIVIDED IN TWO PARTS

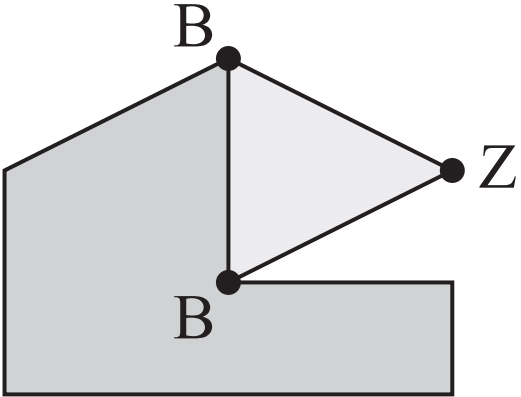
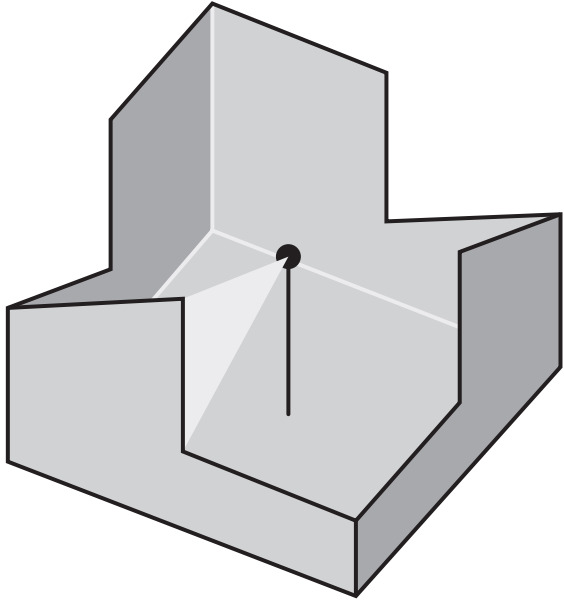
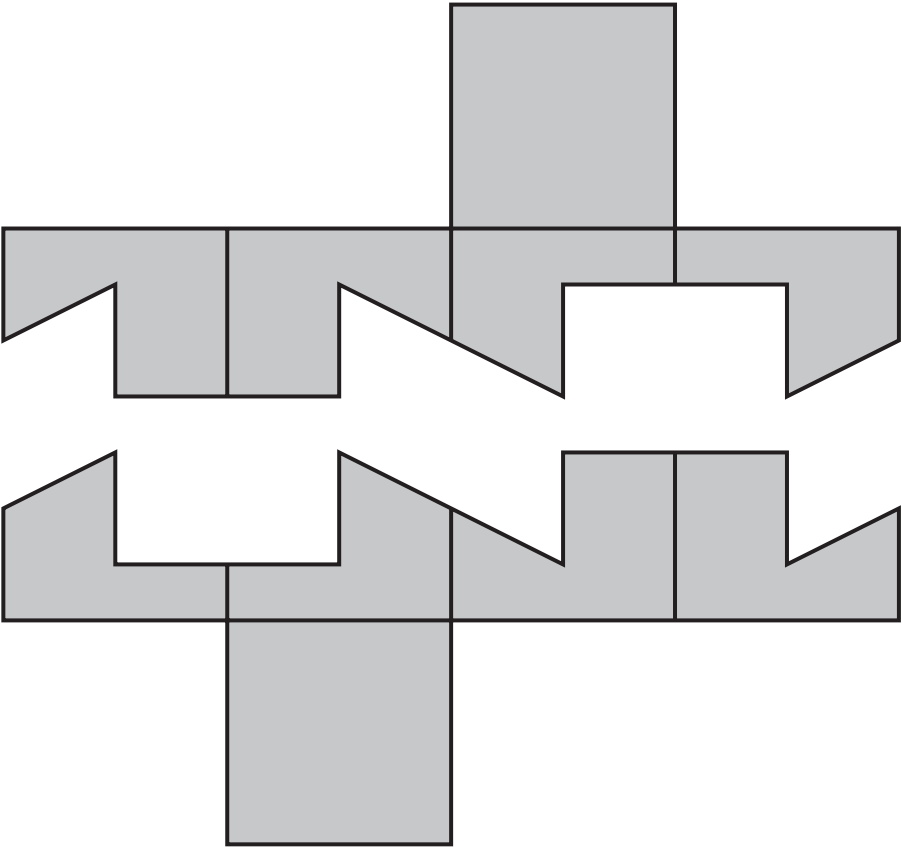


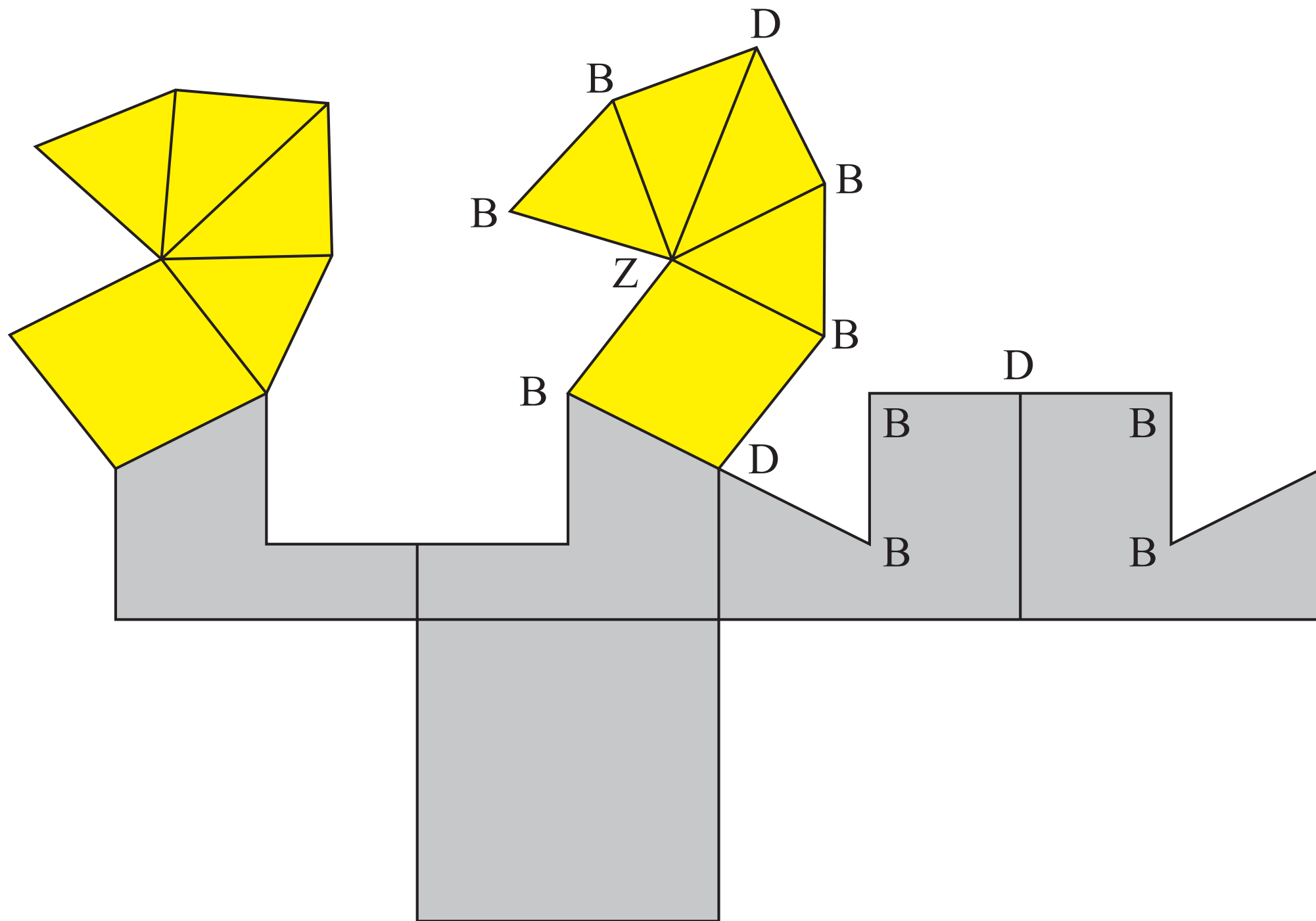
MIRROR SYMMETRY

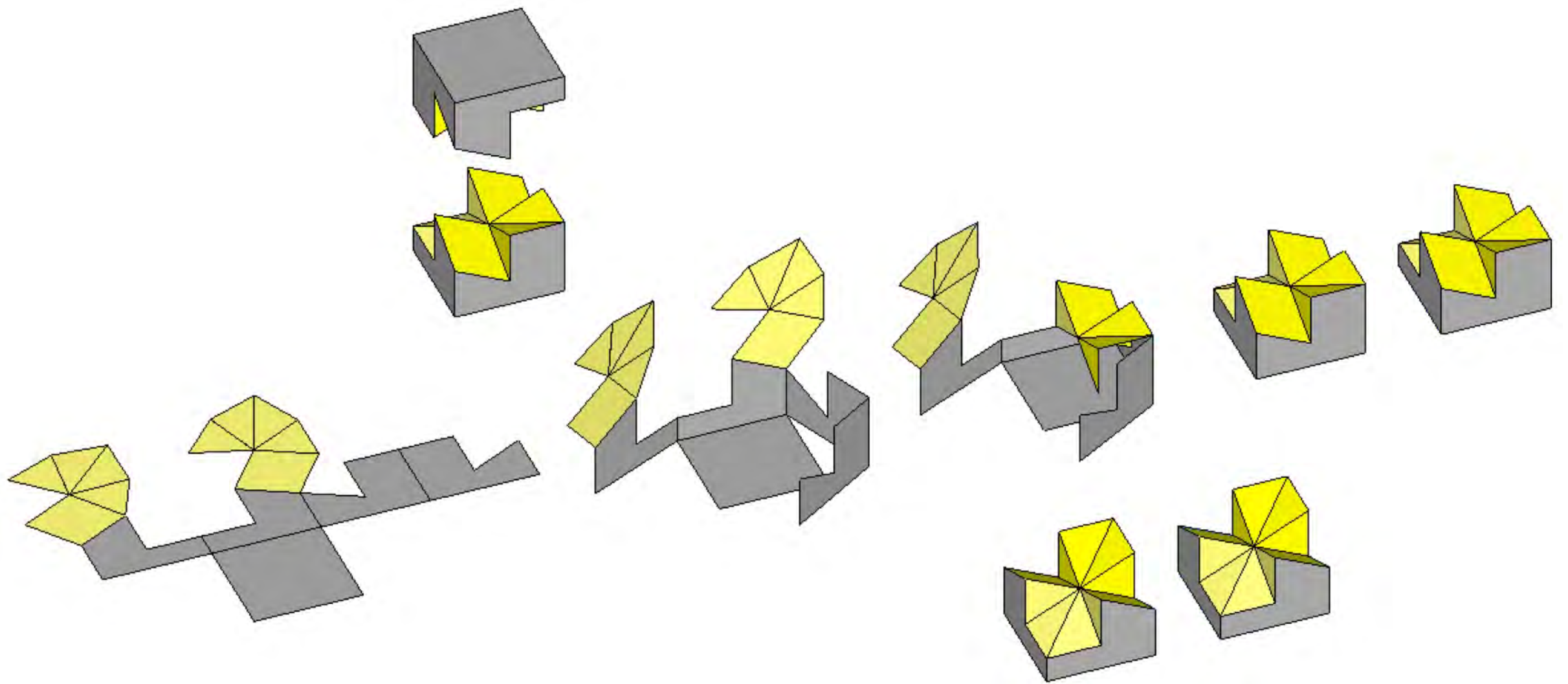
ROTATION OF 180°

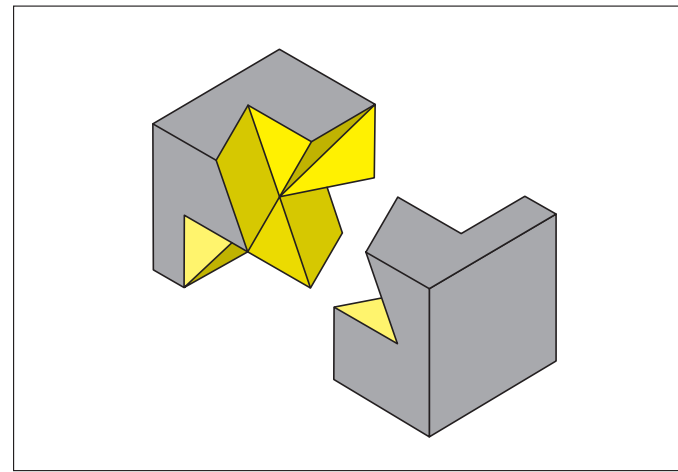
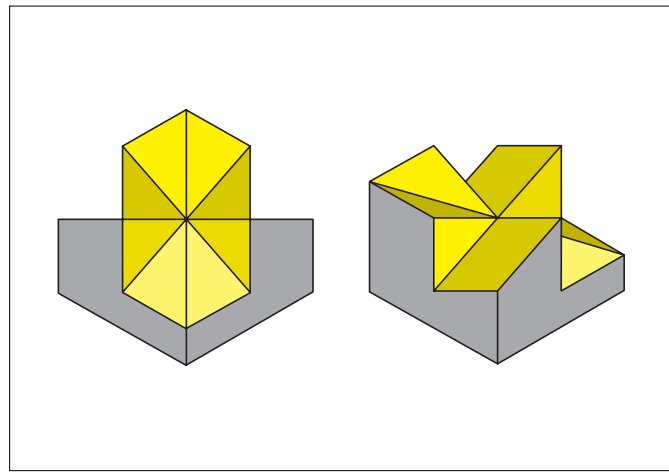
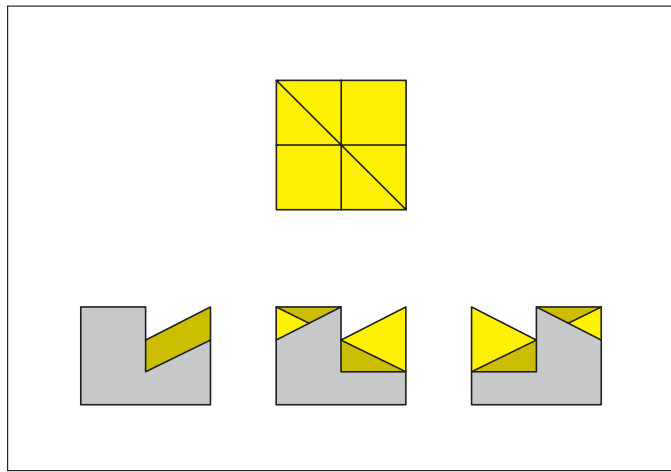
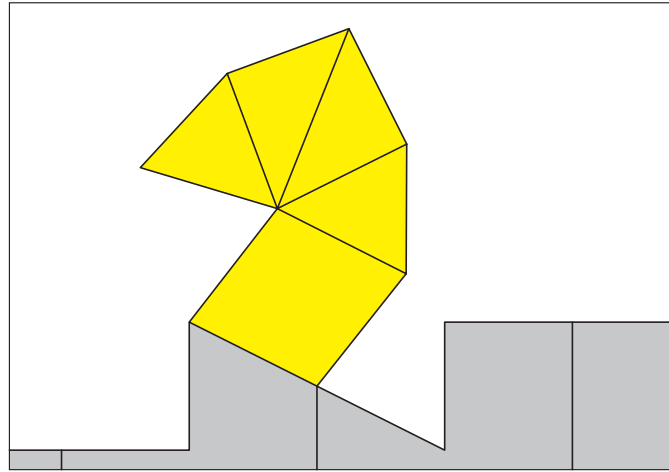
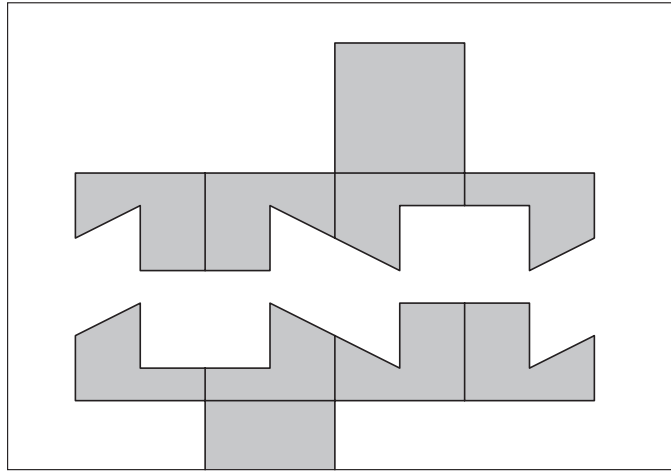


INTERNAL PLANES

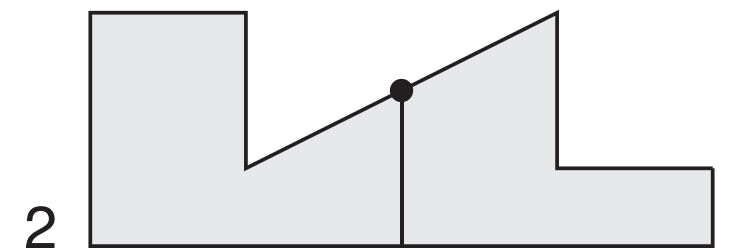
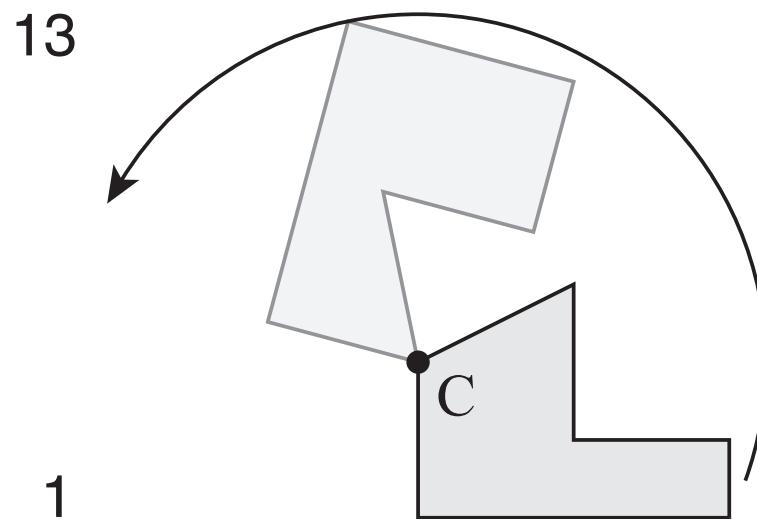
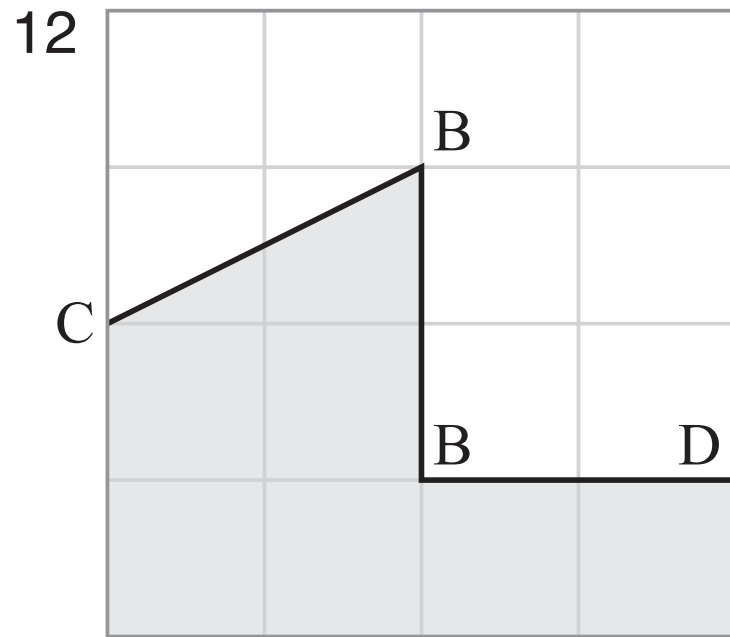




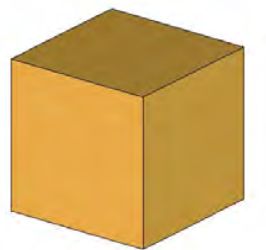




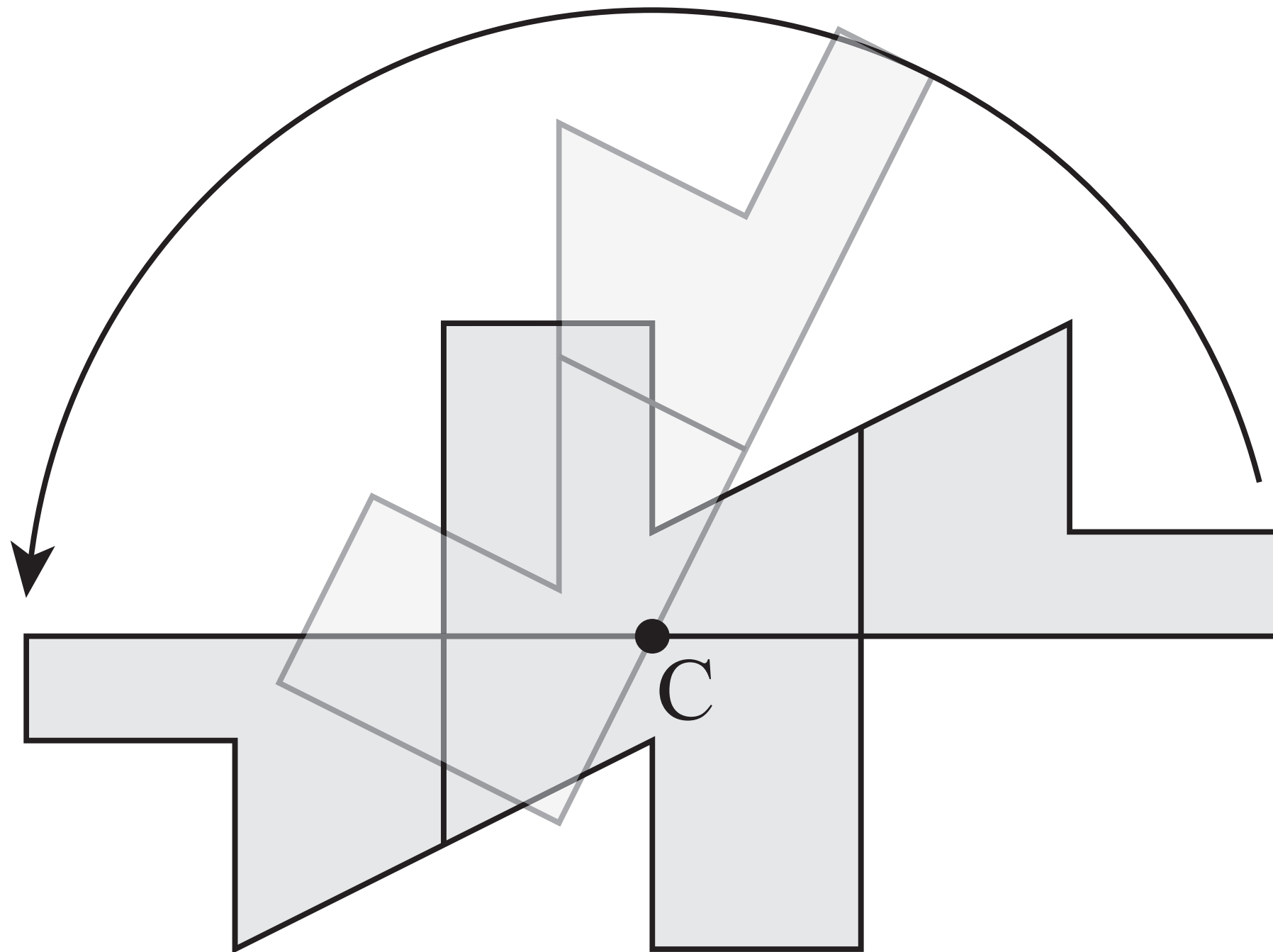
CUBE DIVIDED IN THREE PARTS

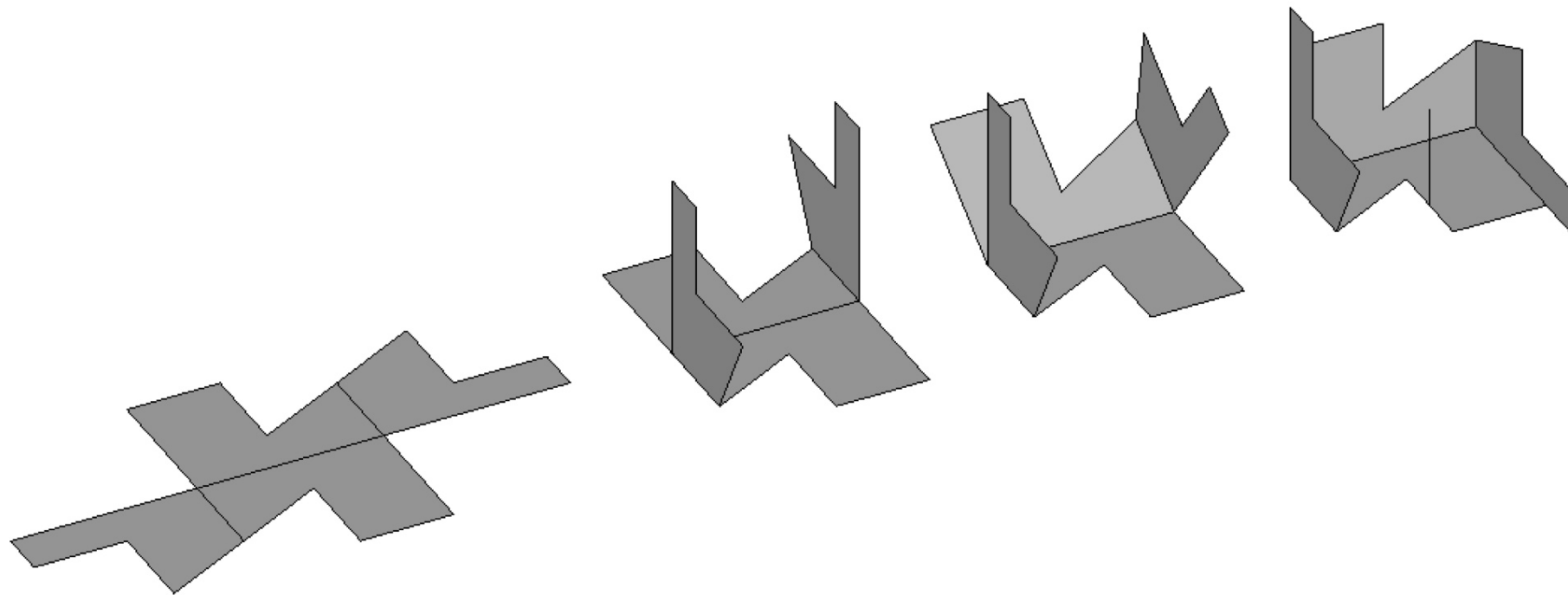
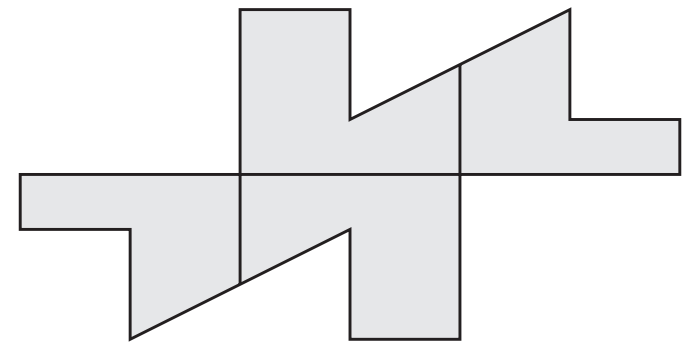
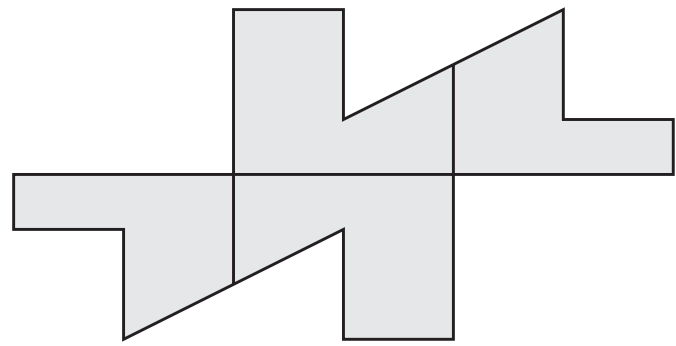
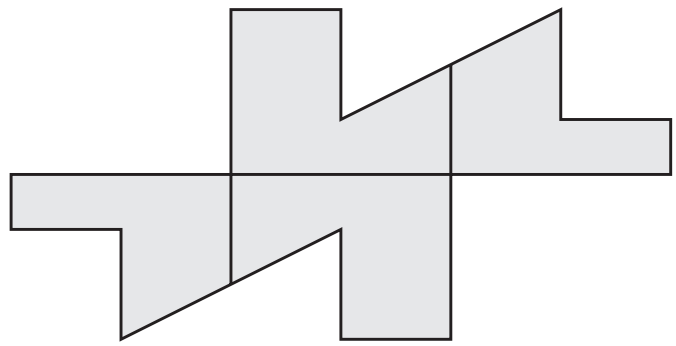


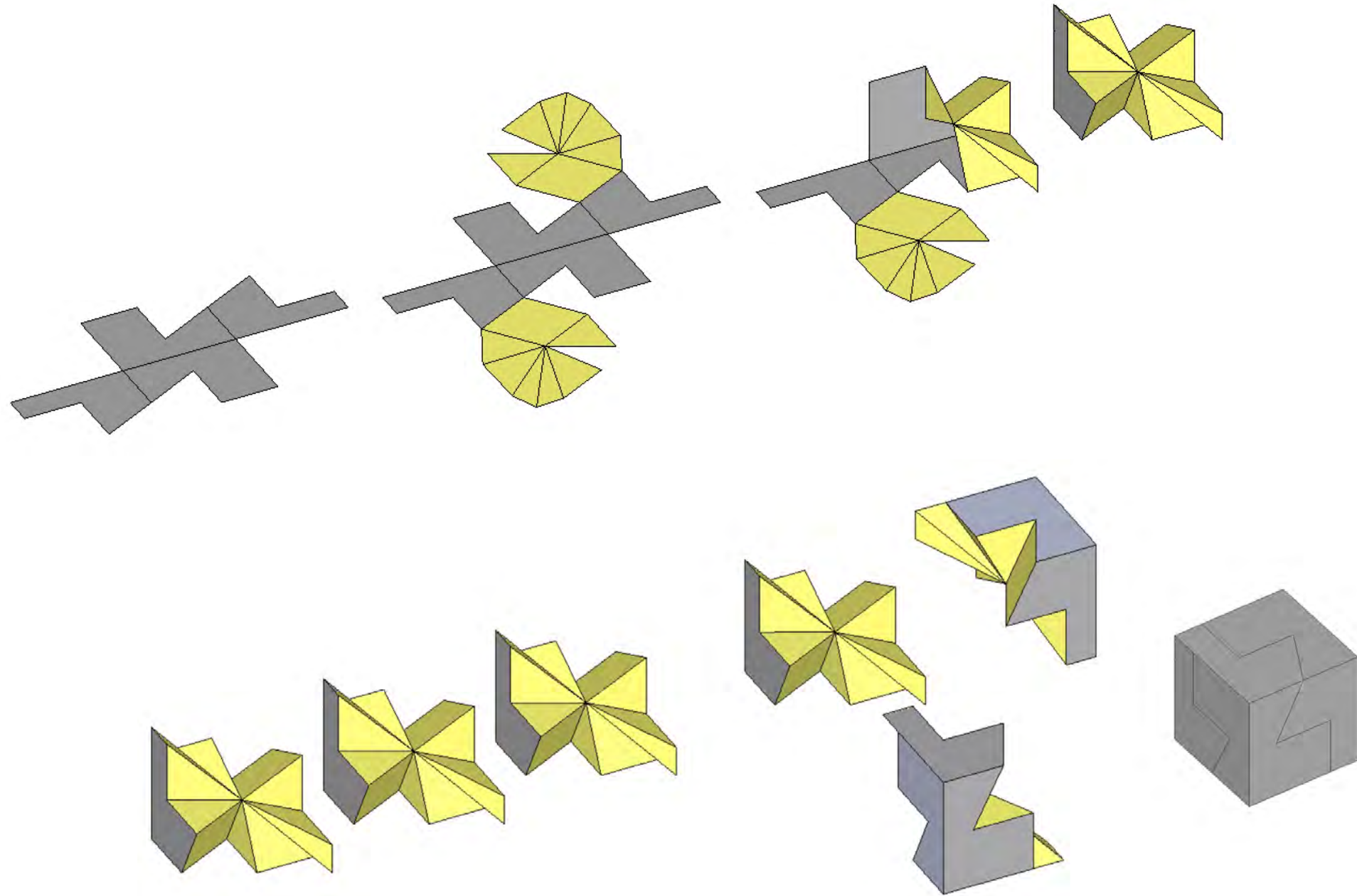
ROTATION OF 180°



ROTATION OF 180°

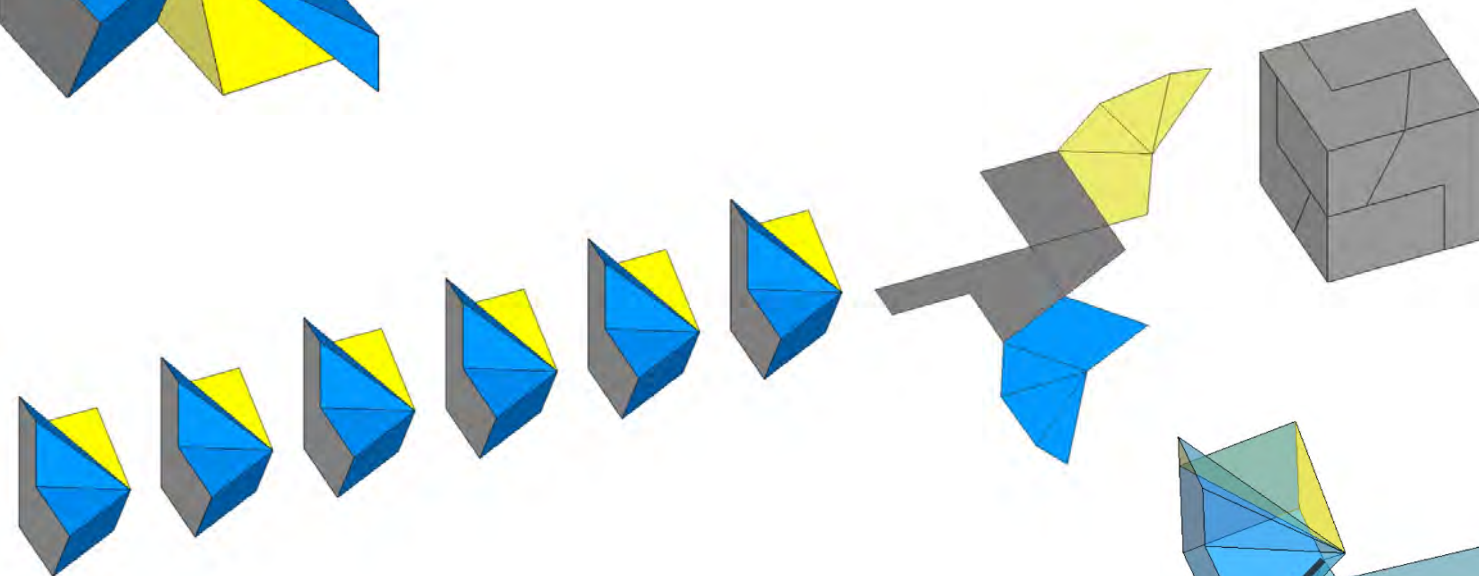
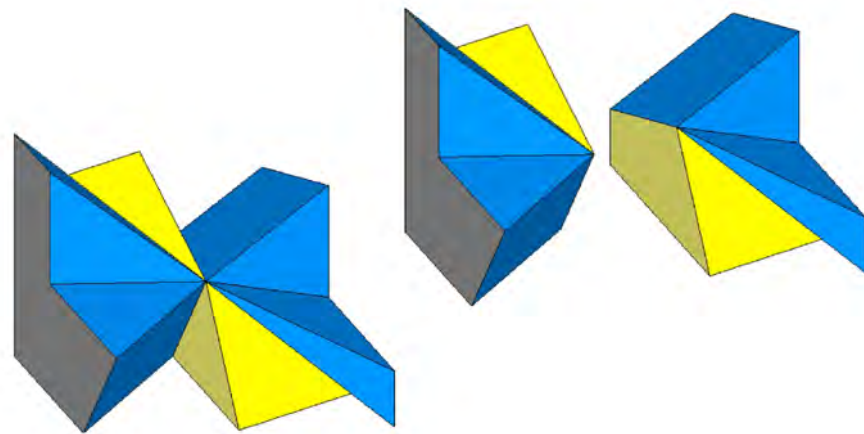








HINGES

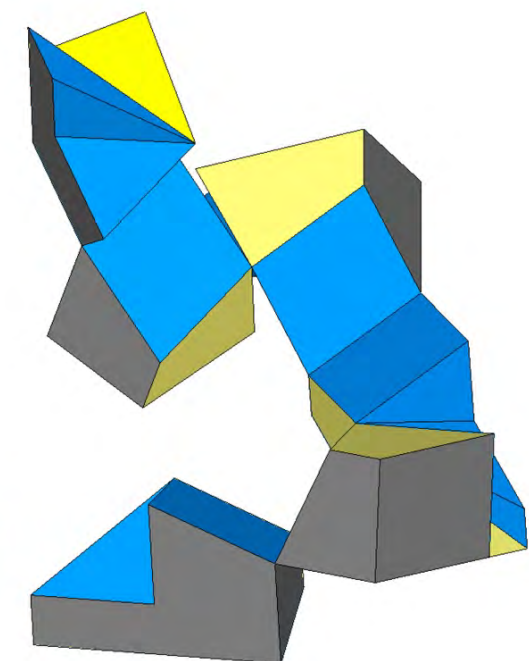
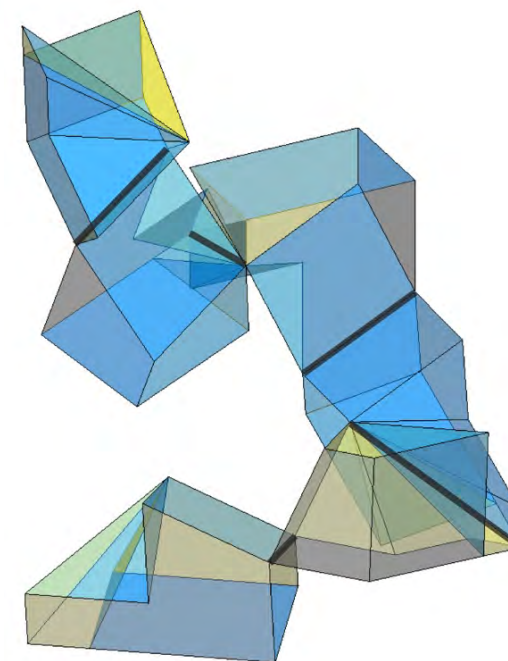


THE CHAINS OF PAIRS OF SPECULAR MODULES

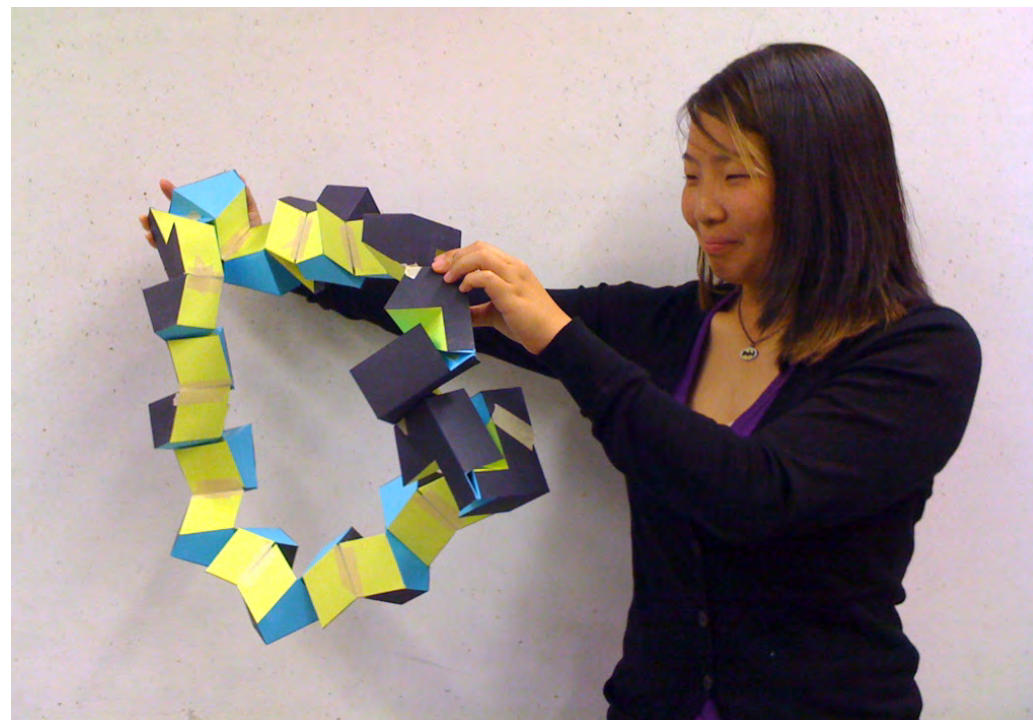
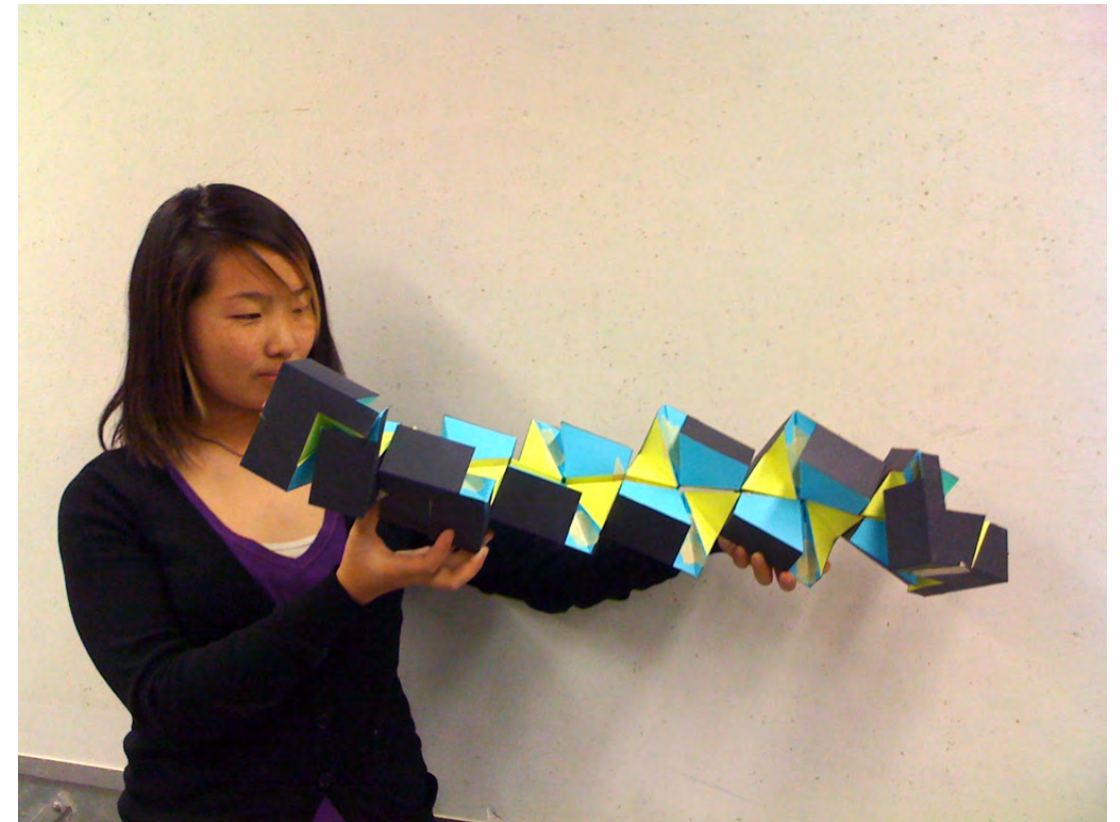
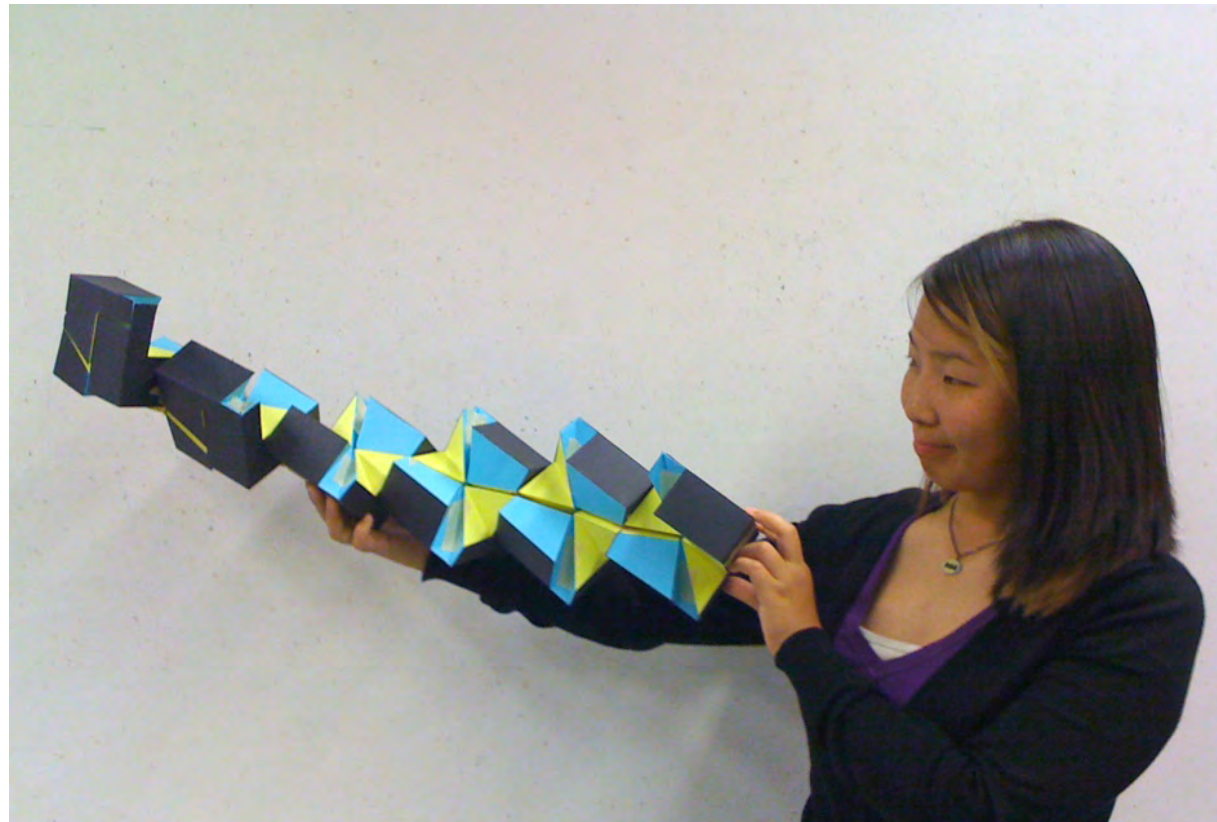
1. The tetrahedron, the cube..., all polyhedra, can be considered as one of the numerous three-dimensional configurations resulting from the folding of flexible chains of modules.



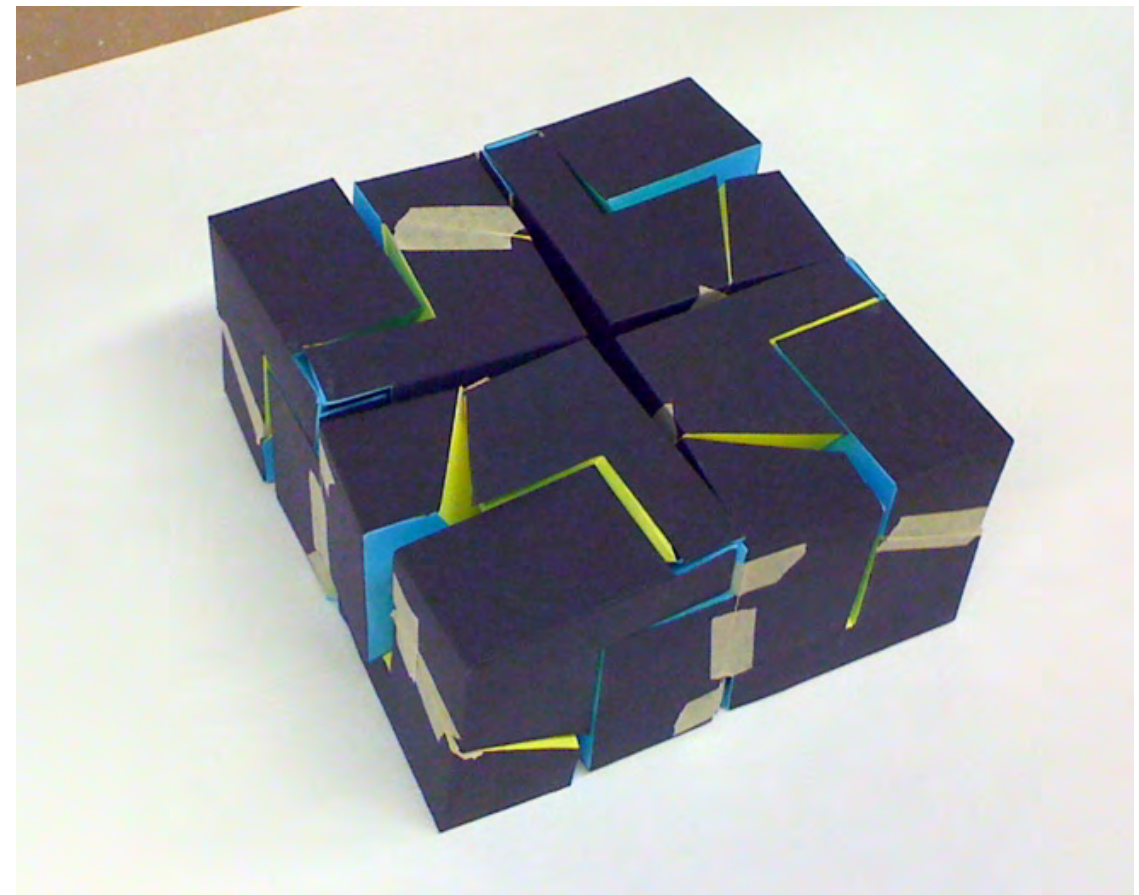
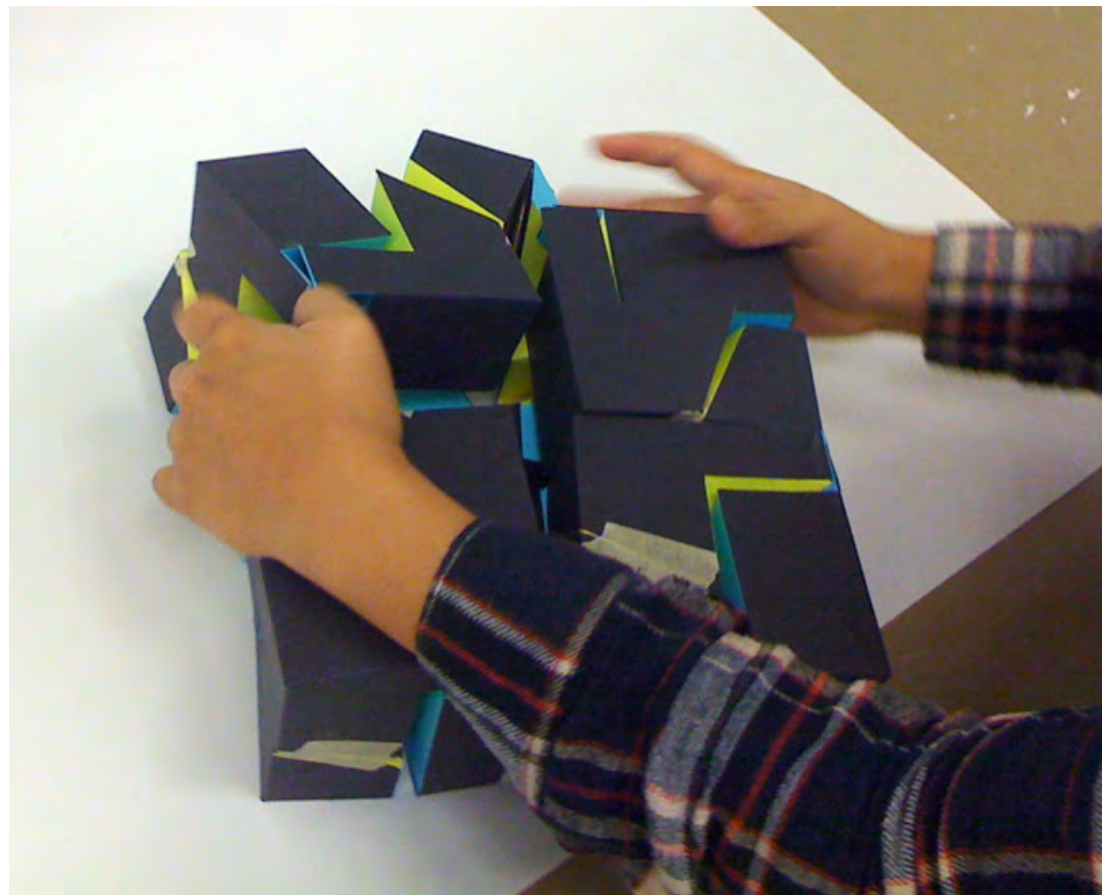
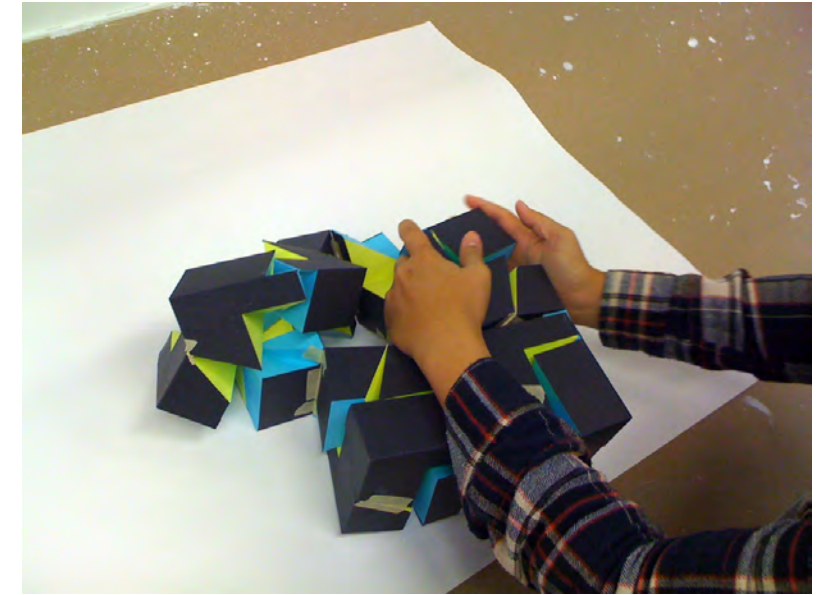
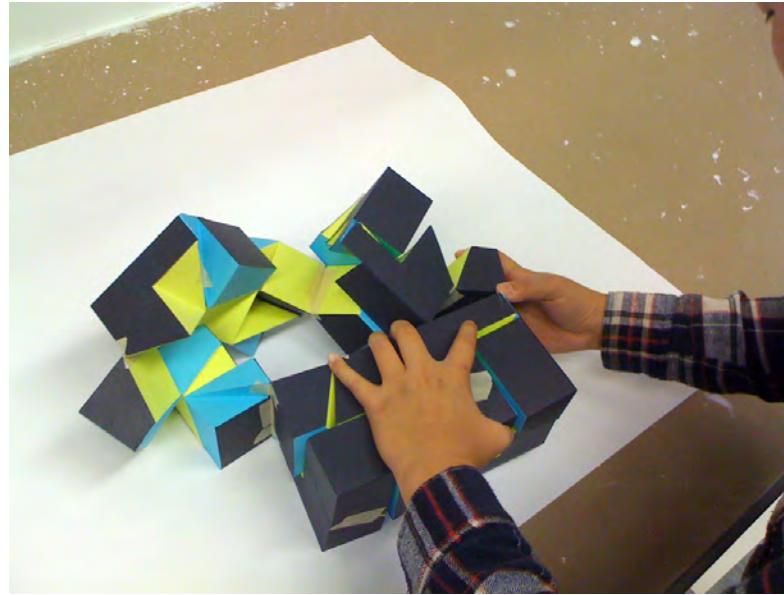
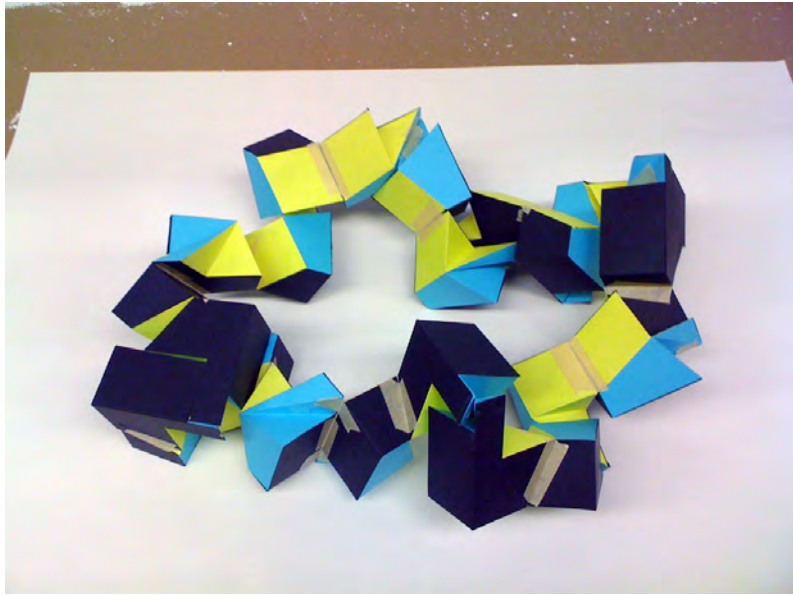
2. The chains are constituted by pairs of modules in which one component is the mirror image of the other.

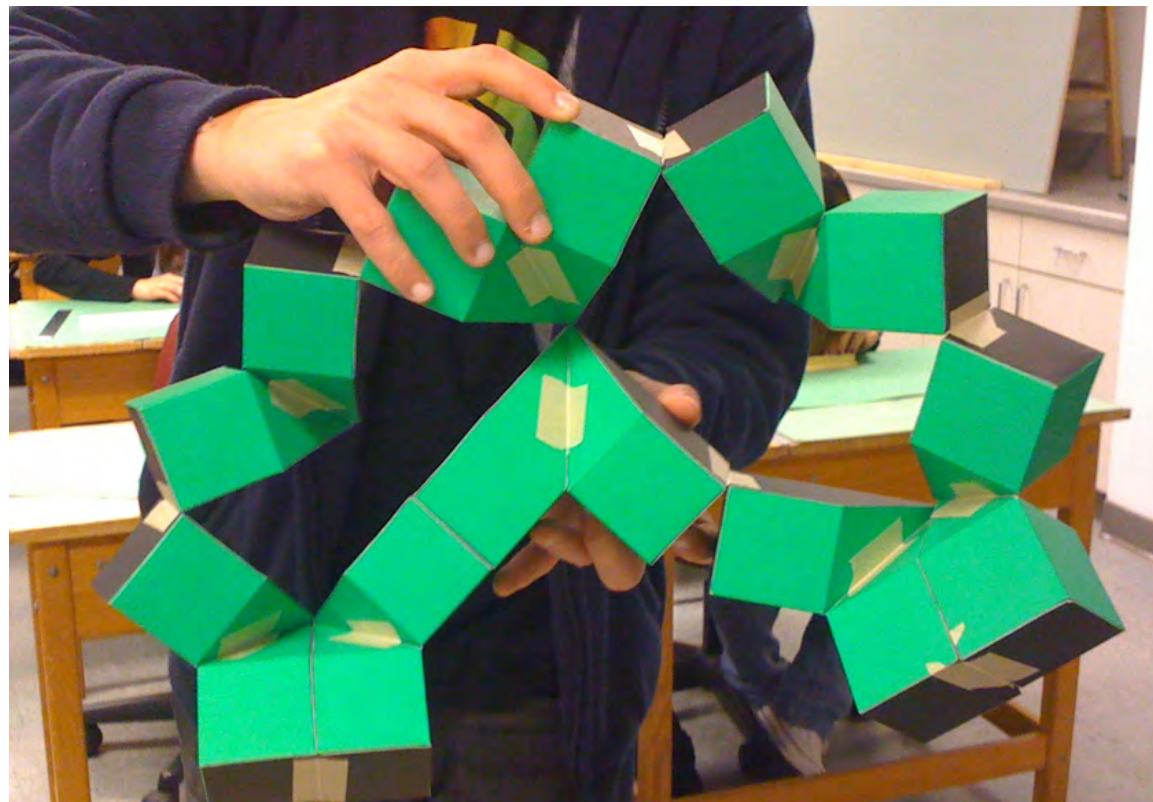


24-MODULE CHAIN



CHAIN DESIGN BY FLORENCE YUEN
SAN FRANCISCO STATE UNIVERSITY

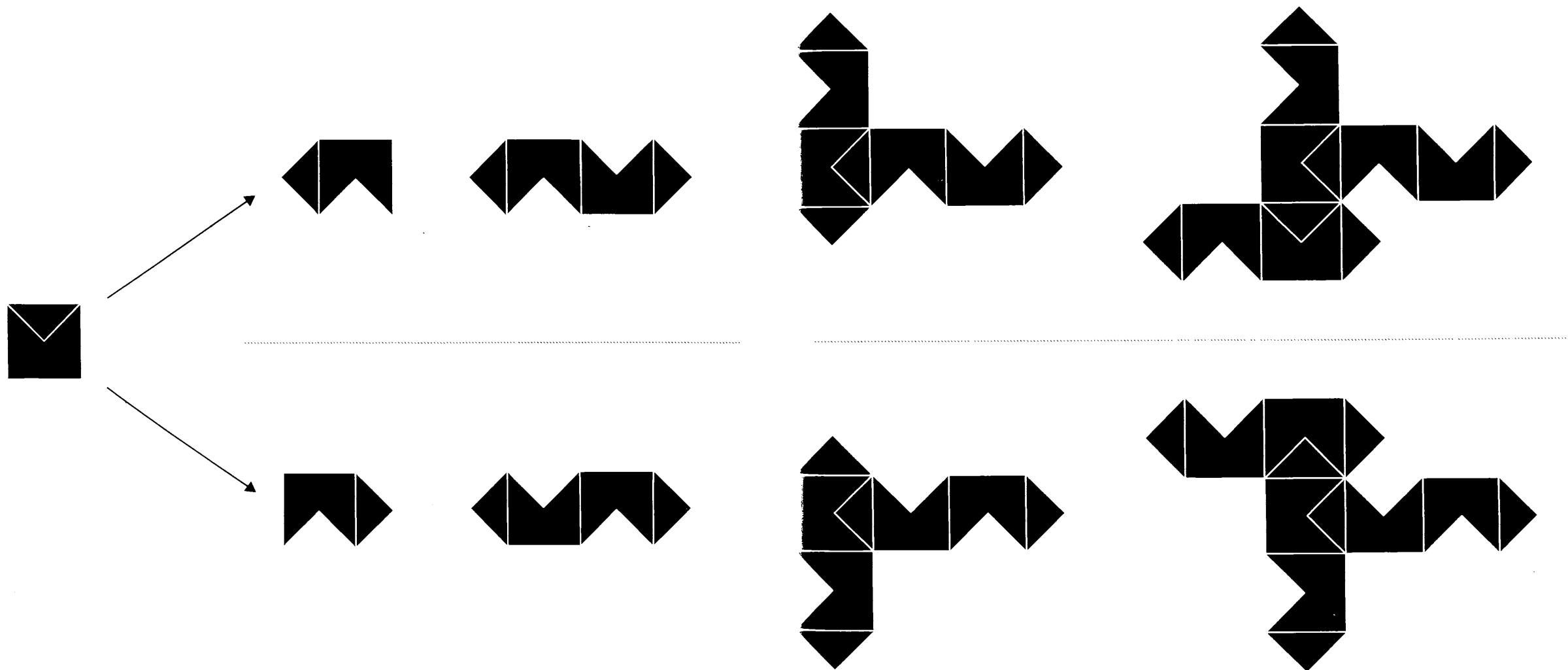




AN INVITATION TO EXPLORE

INITIAL STEPS

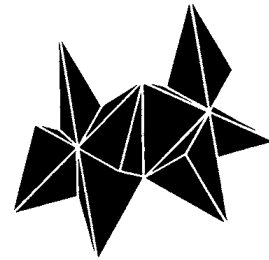
Overview example with eight configurations in fold-out progression, laid out in two sequences, one to the right and one to the left.



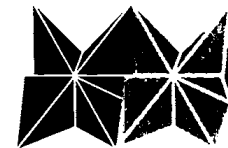
CONSTRUCTION OF A CHAIN

CONSTRUCTION OF A CHAIN

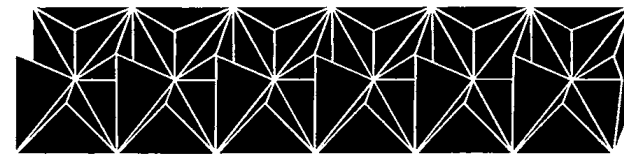
A practical way to realize a hinge consists in joining the modules together with a little piece of scotch tape.



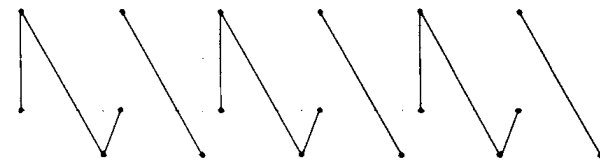
Coupling.



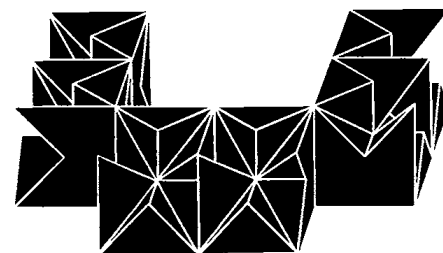
By connecting together six pairs (twelve modules) we construct a chain.



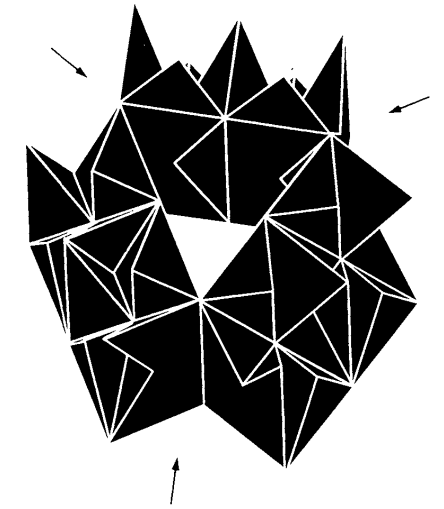
Let's now dispose the modules on a line, following the montage scheme that indicates the spatial position of the hinges.



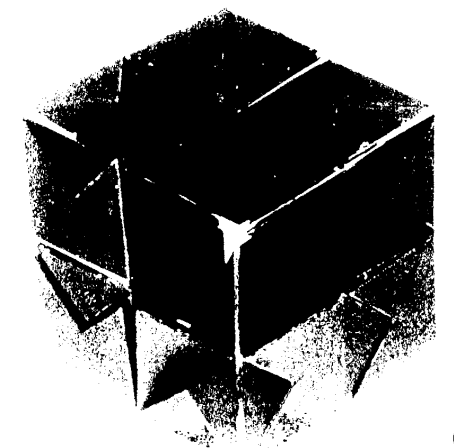
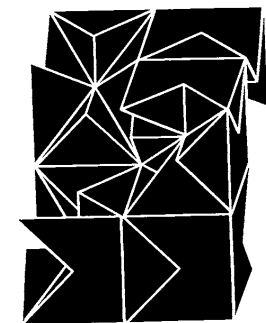
Connecting the first and last of the modules the chain will spontaneously dispose itself in the simplest obtainable form of closed chain: the closed chain with a triangular configuration.



By applying, at the same time, a light pressure on the points indicated by the arrows,

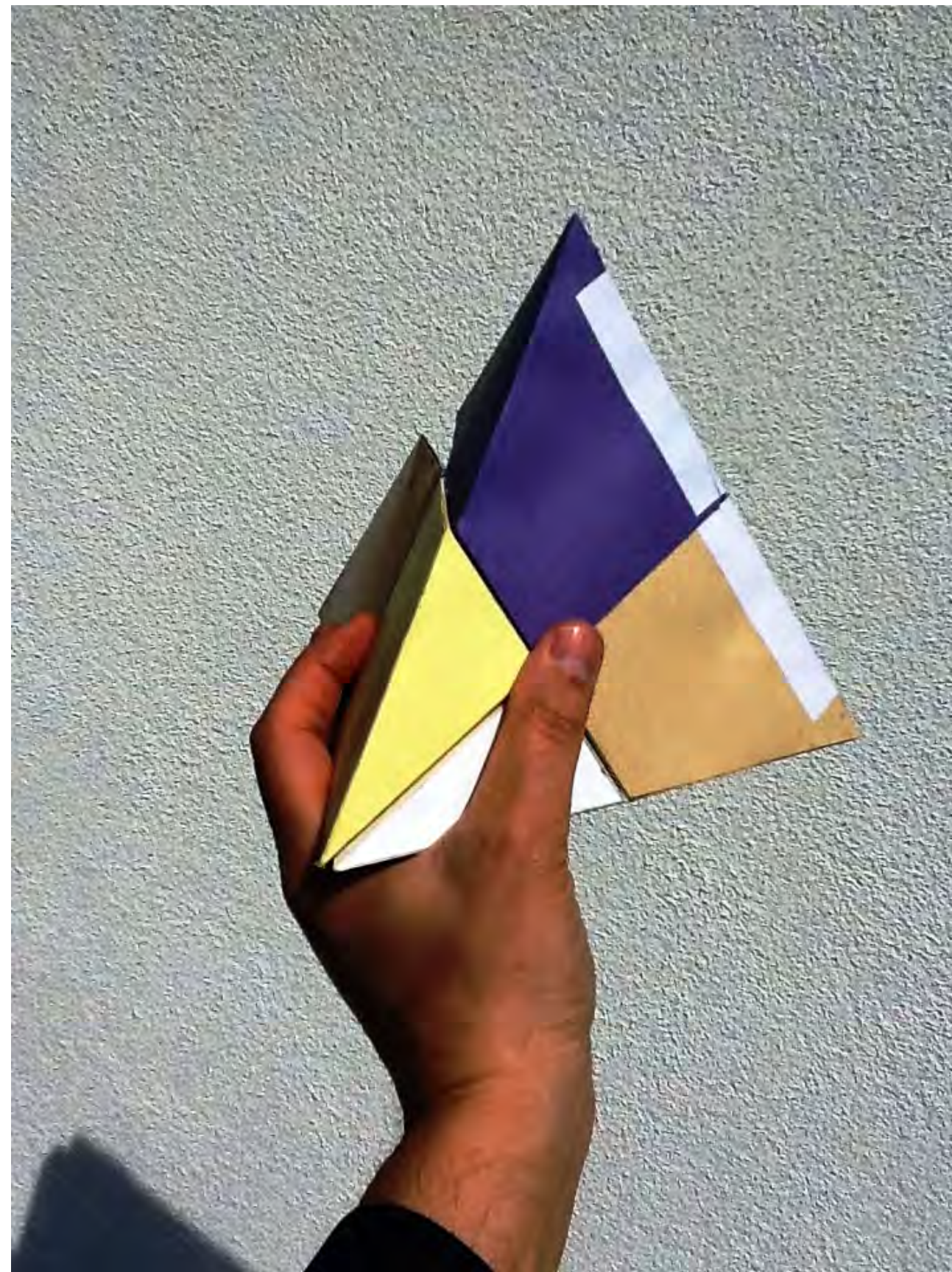
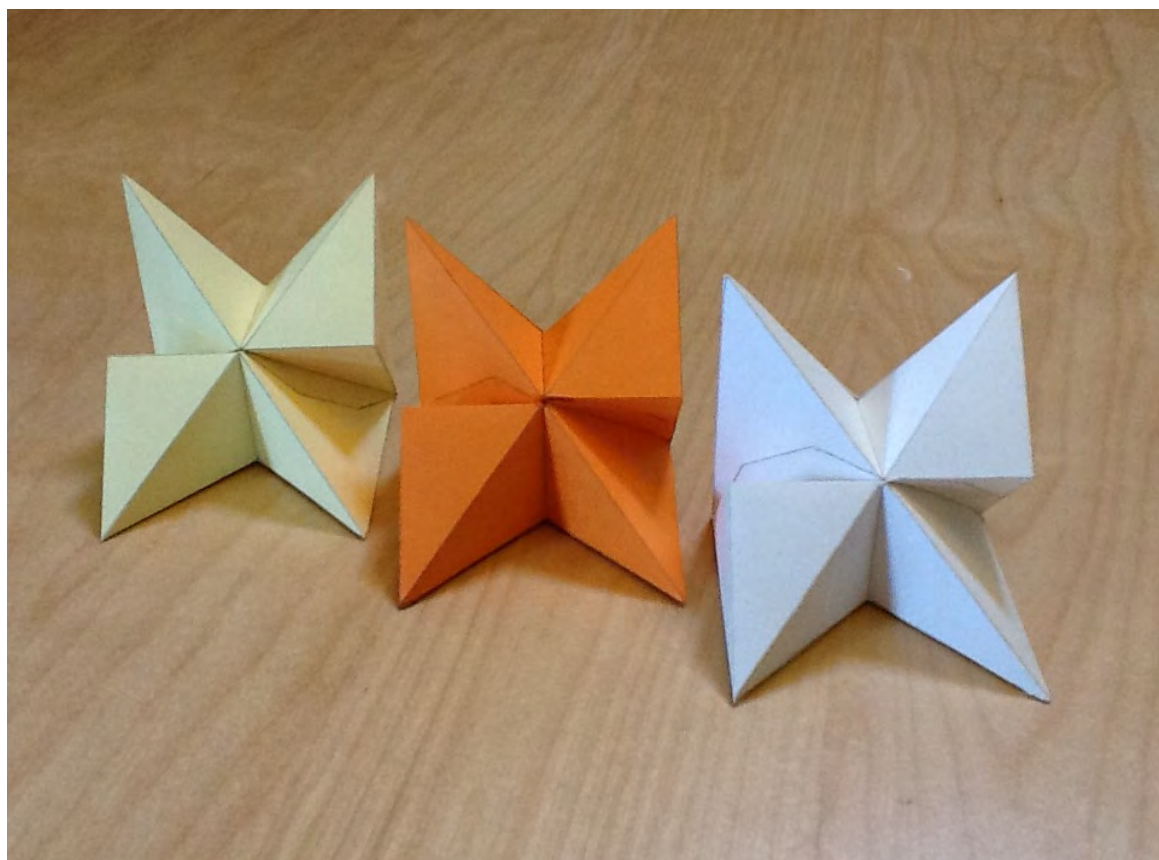
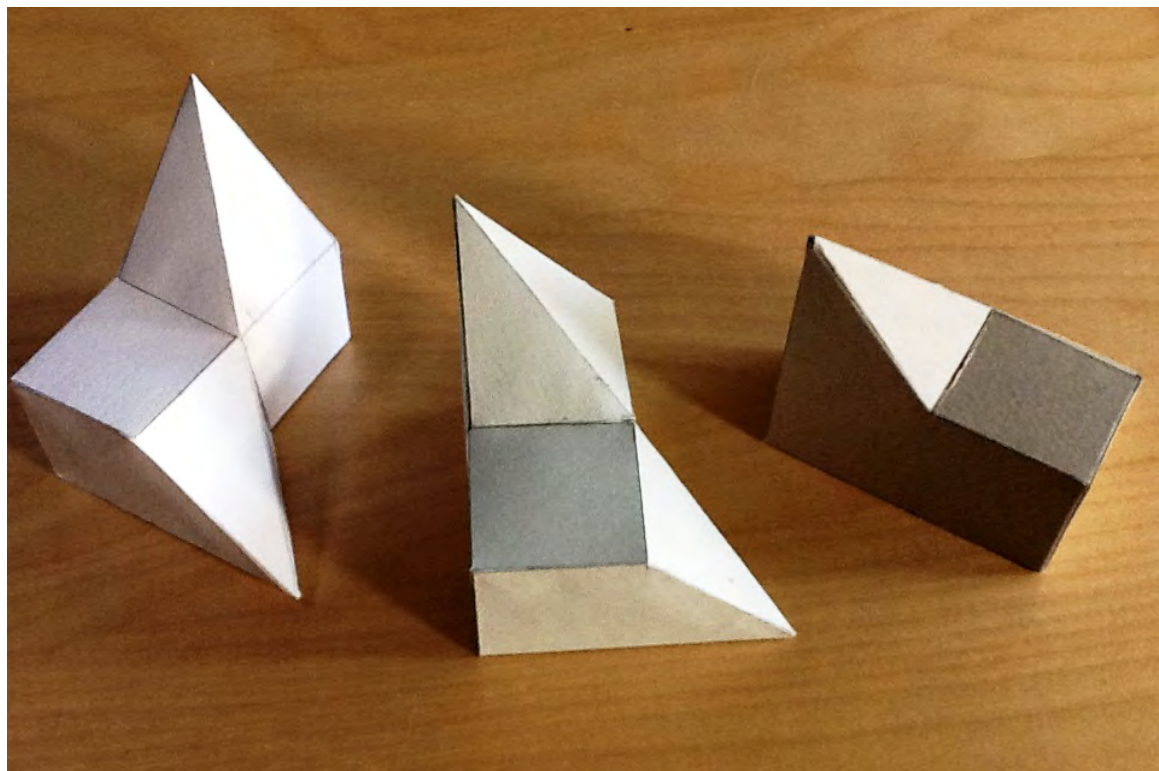


the chain will assume a cubic form.

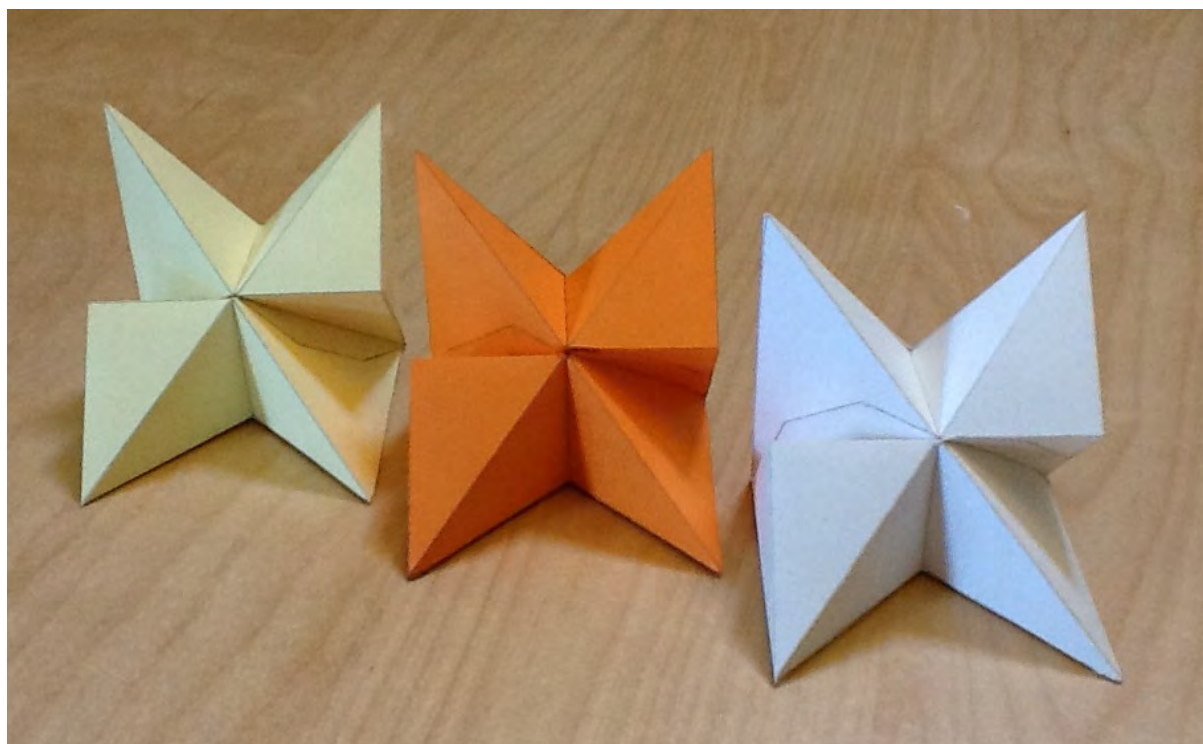
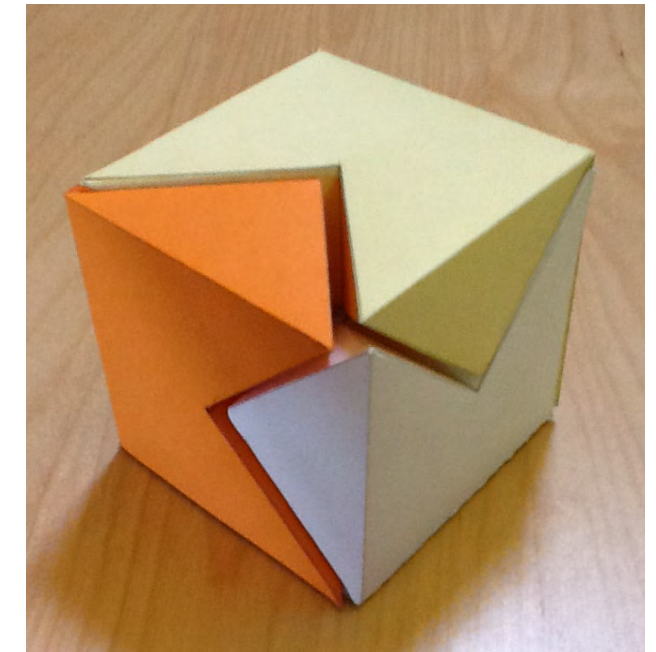
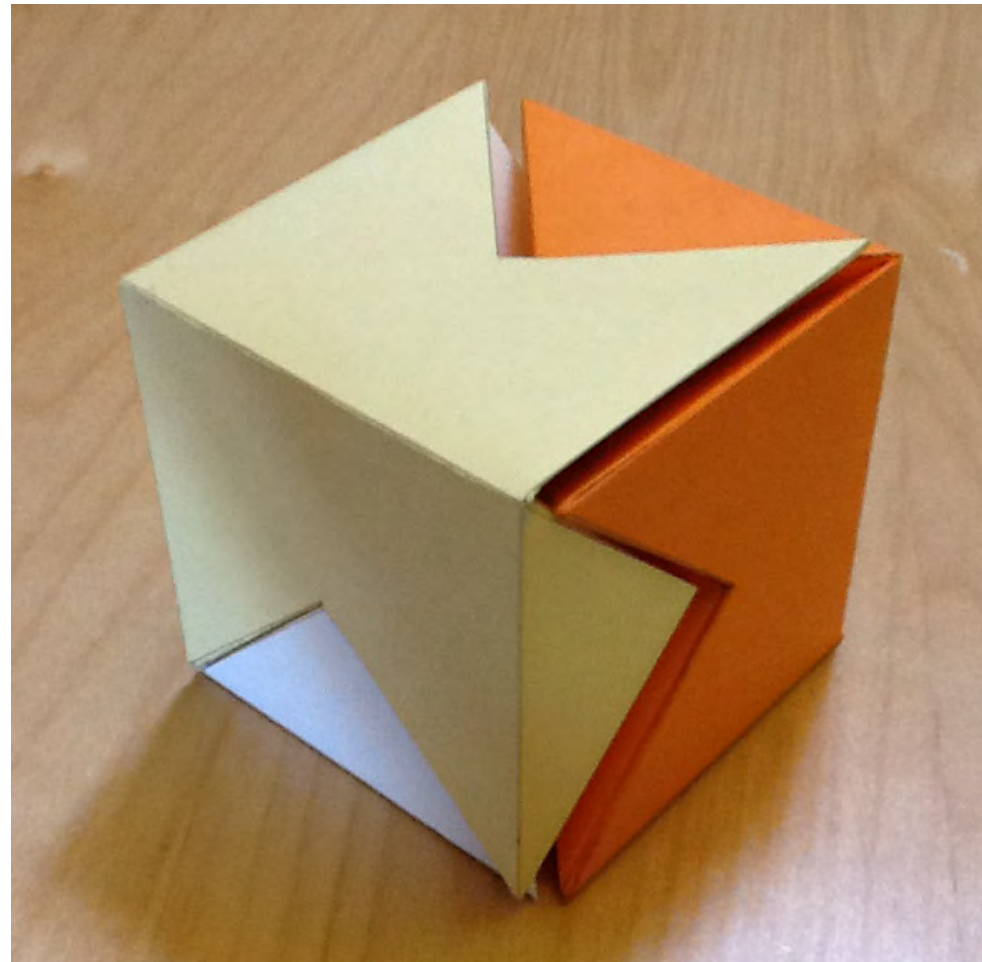
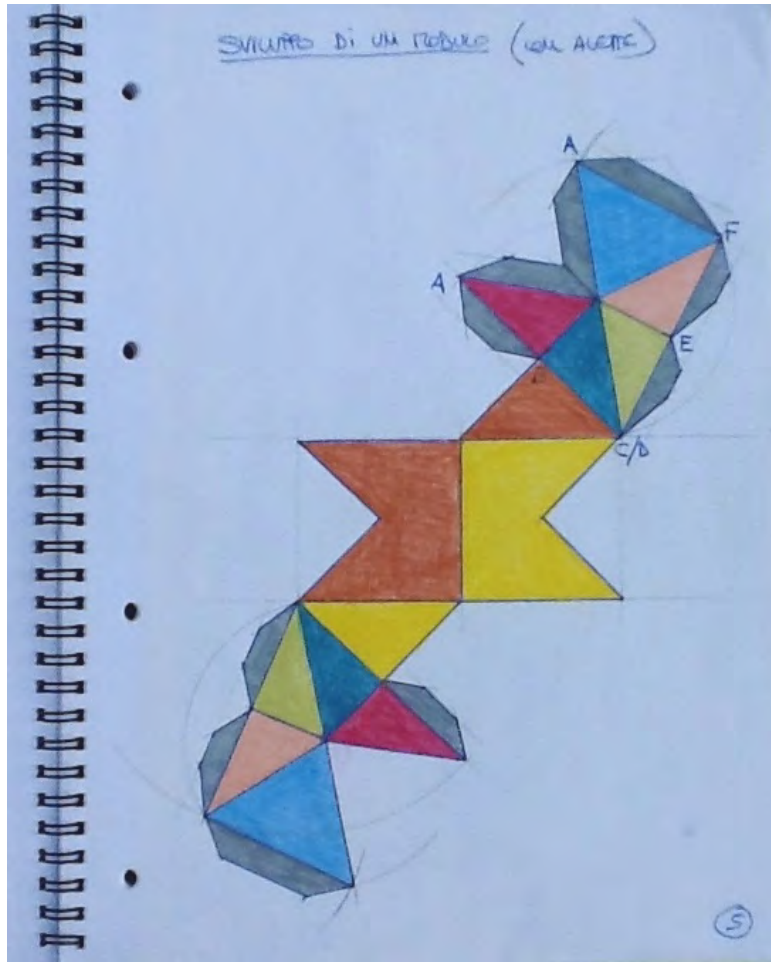


67

MODELS BUILT BY MIDDLE SCHOOL STUDENTS – OFFANENGO, ITALY



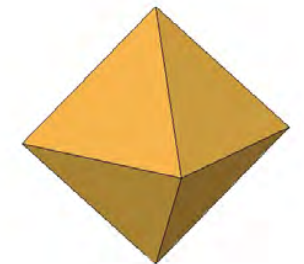
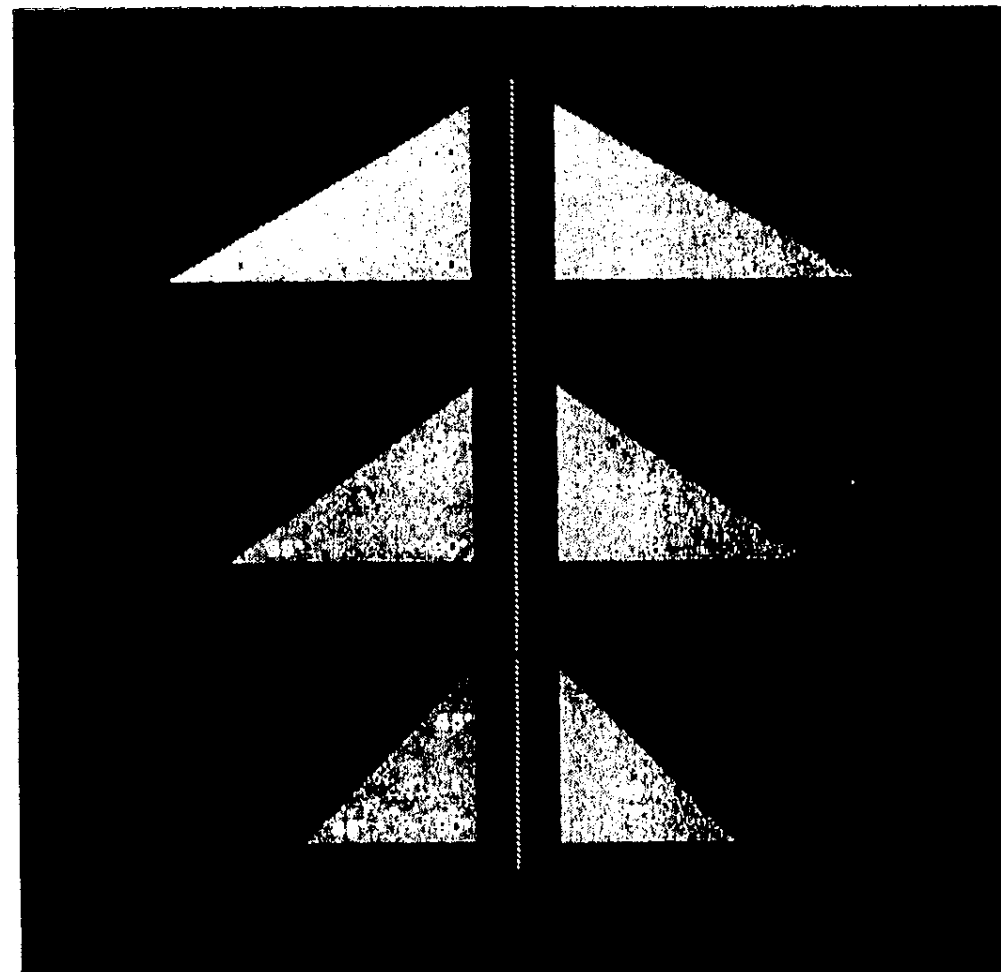
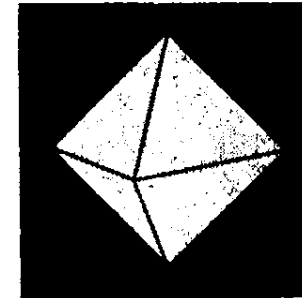
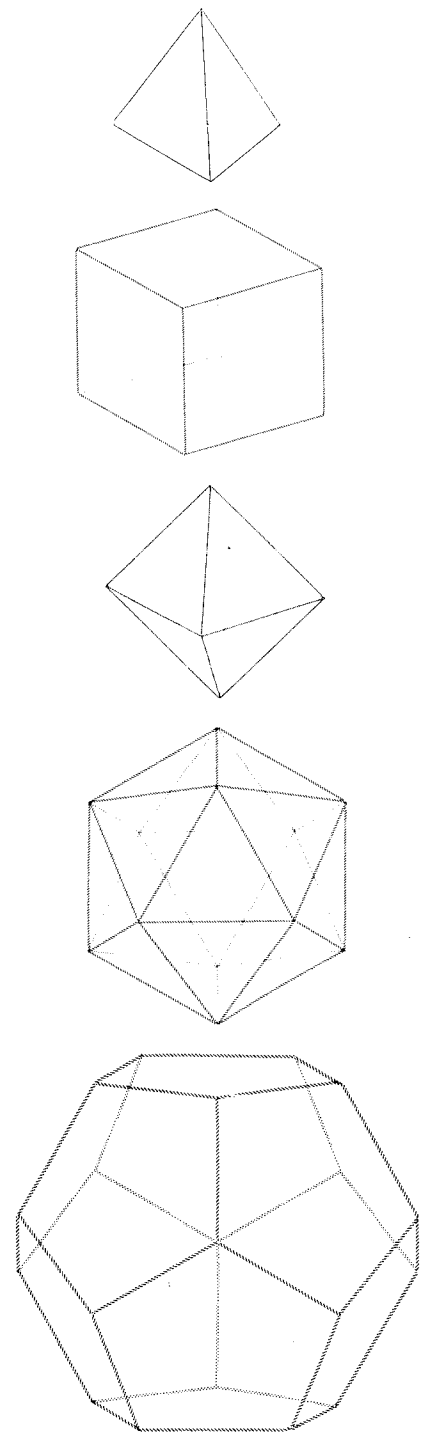
MODELS BUILT BY MIDDLE SCHOOL STUDENTS – OFFANENGO, ITALY



**MODEL BUILT BY FEDERICA DESTRI
OFFANENGO MIDDLE SCHOOL, 2016-2017 (ITALY)**

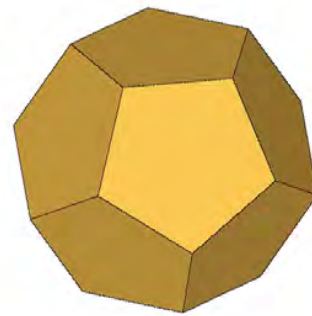
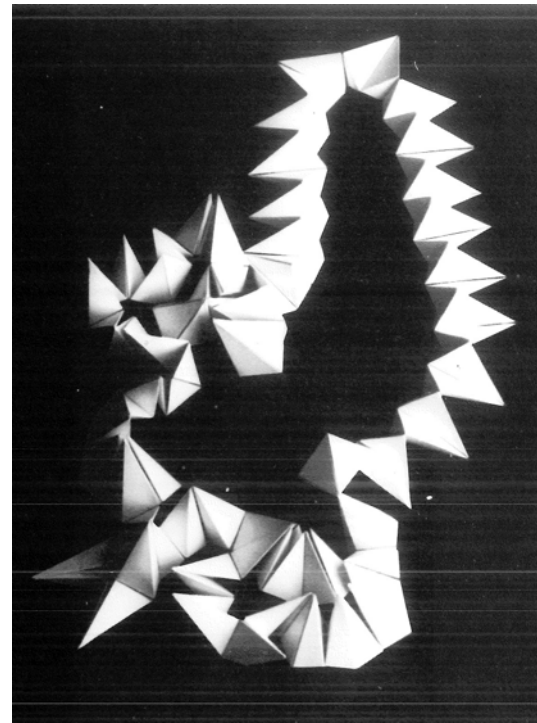
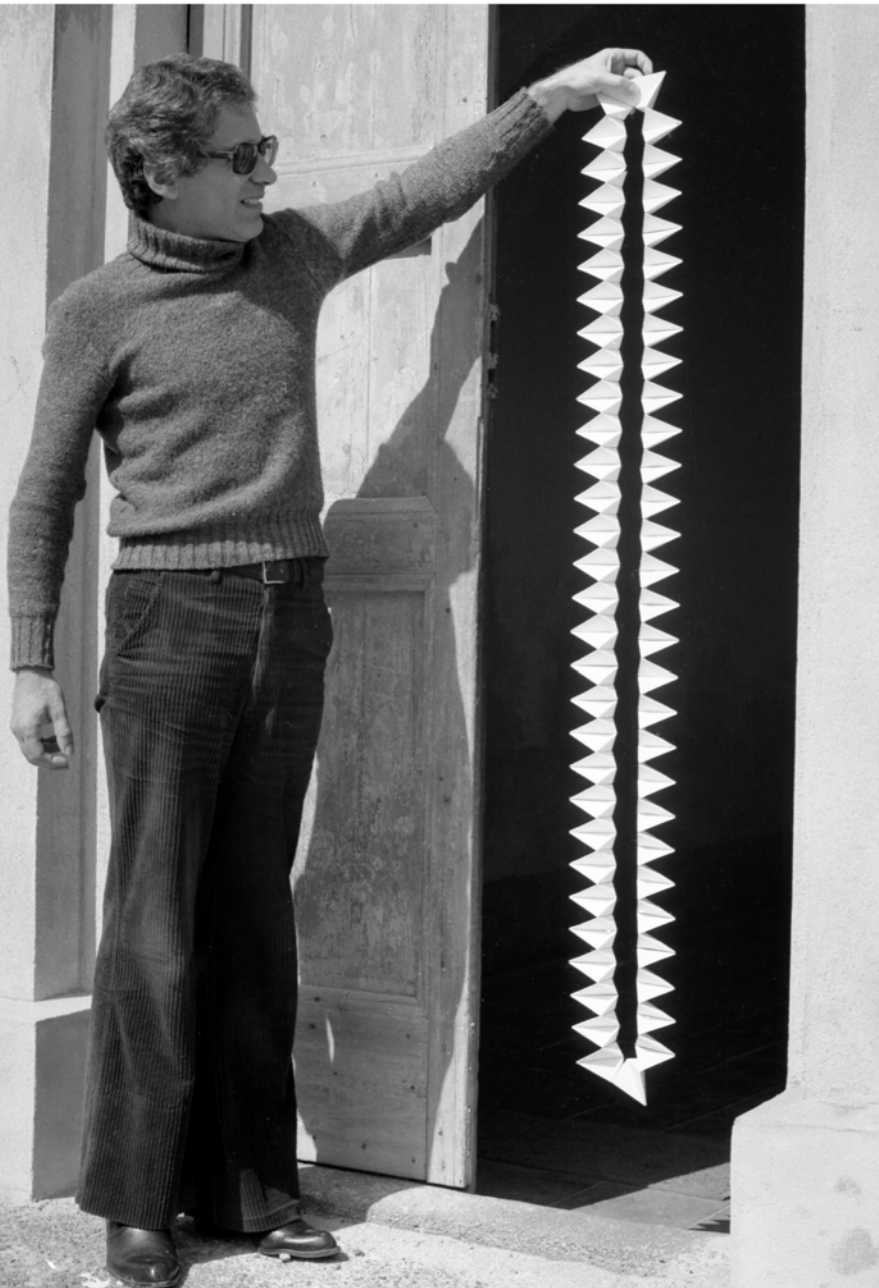


INSTRUCTIONS FOR PLATONIC SOLID CHAINS

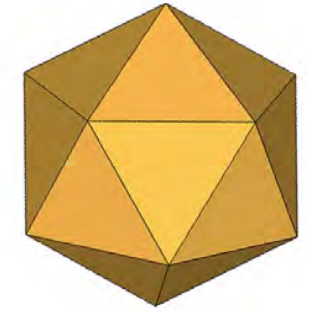


I cinque poliedri platonici.

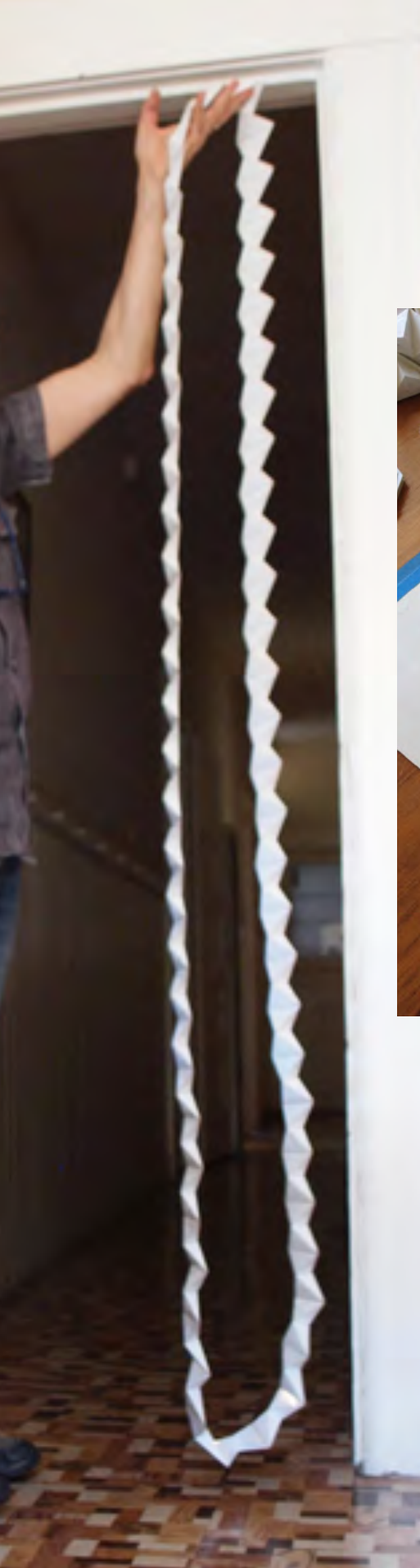
DODECAHEDRON: 120 PYRAMIDS

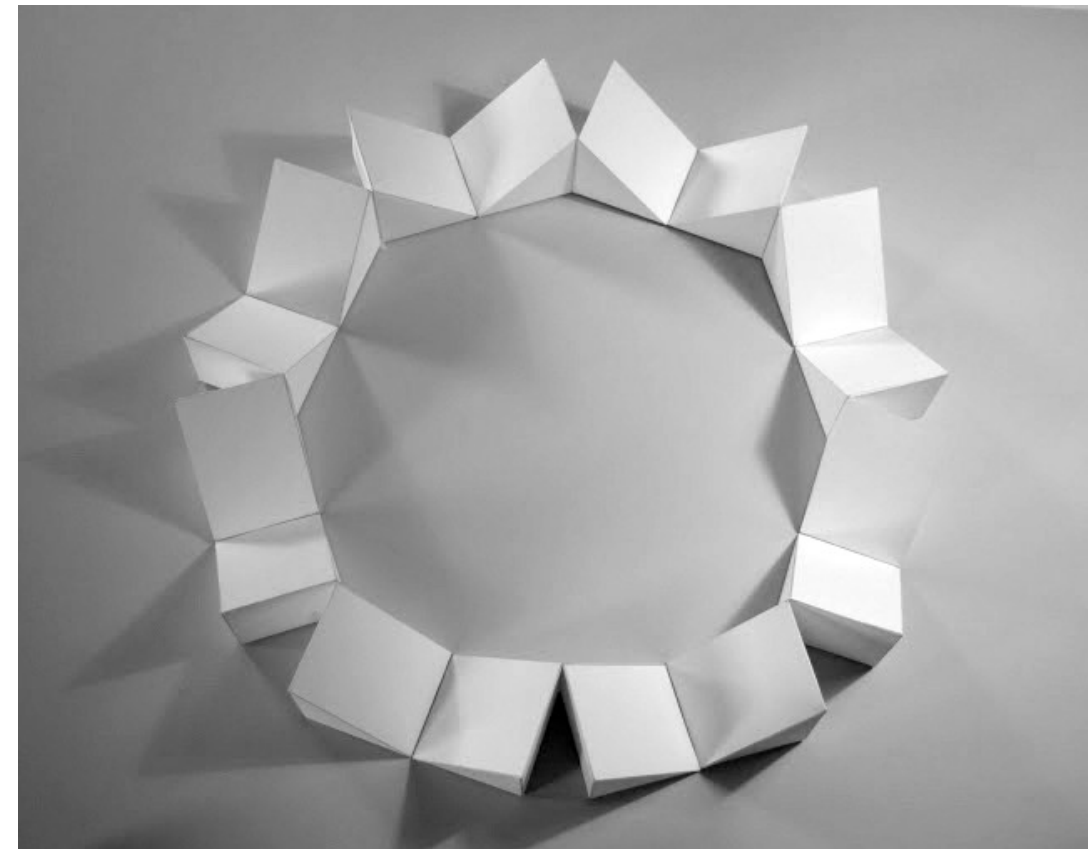
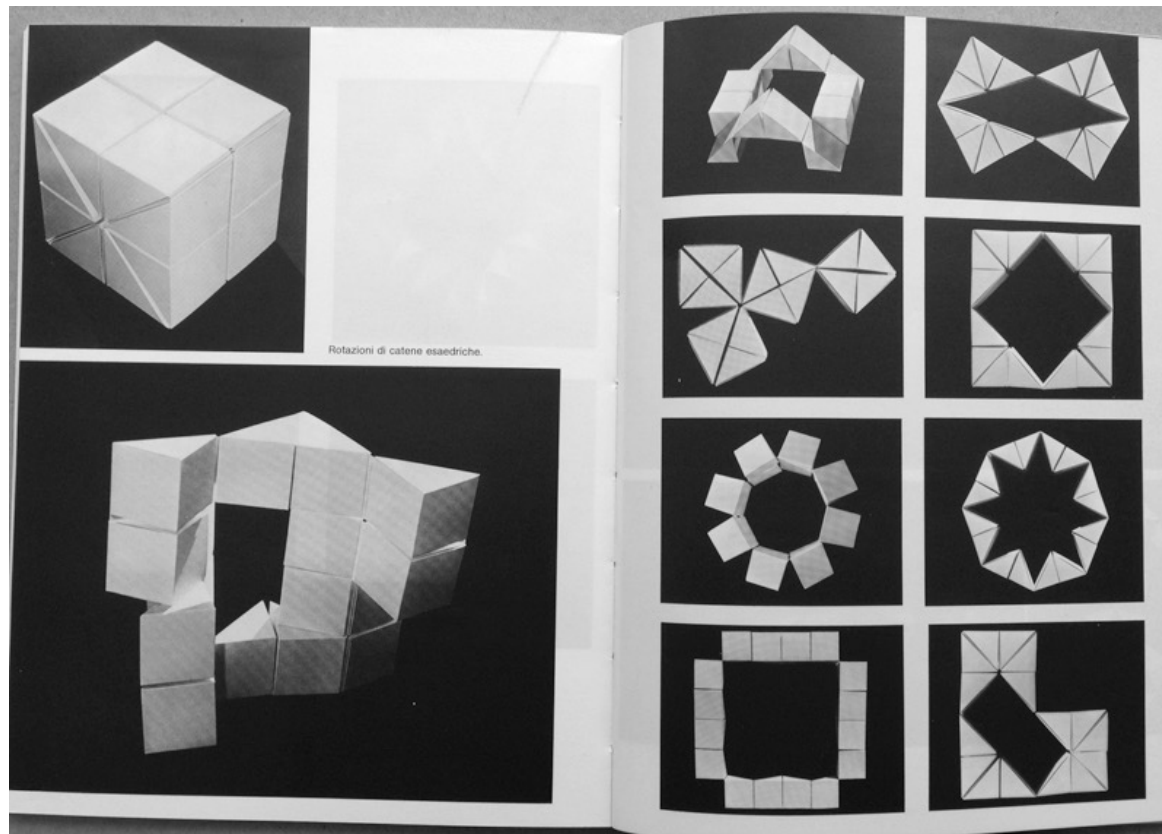


ICOSAHEDRON: 120 PYRAMIDS



(Trogu & Nies, model based on Scarpa, 2015)

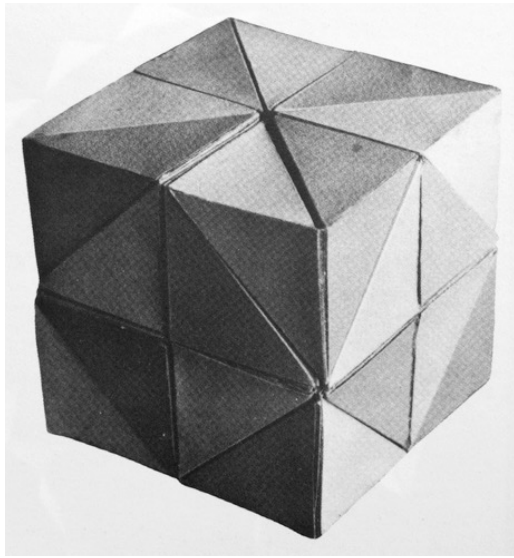




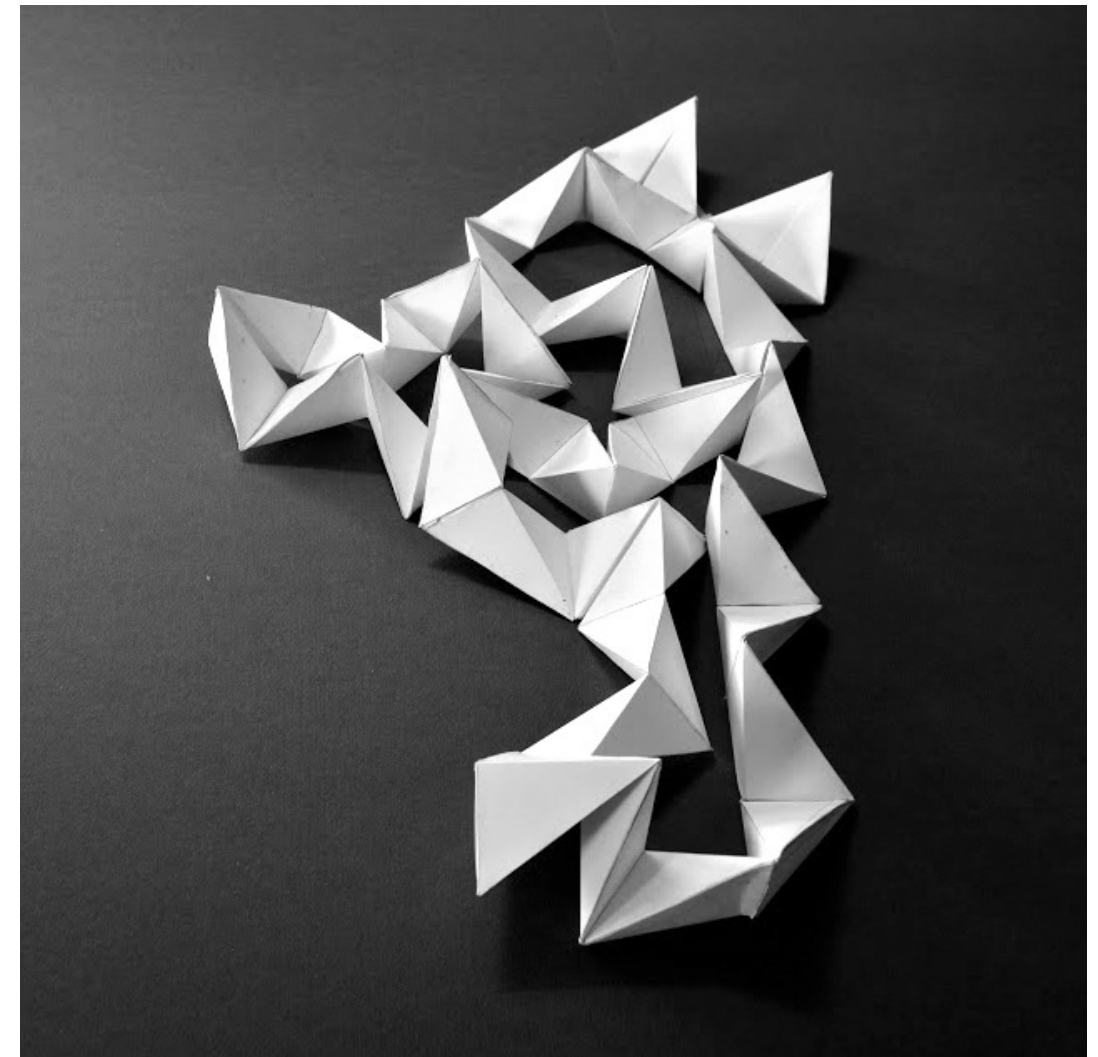
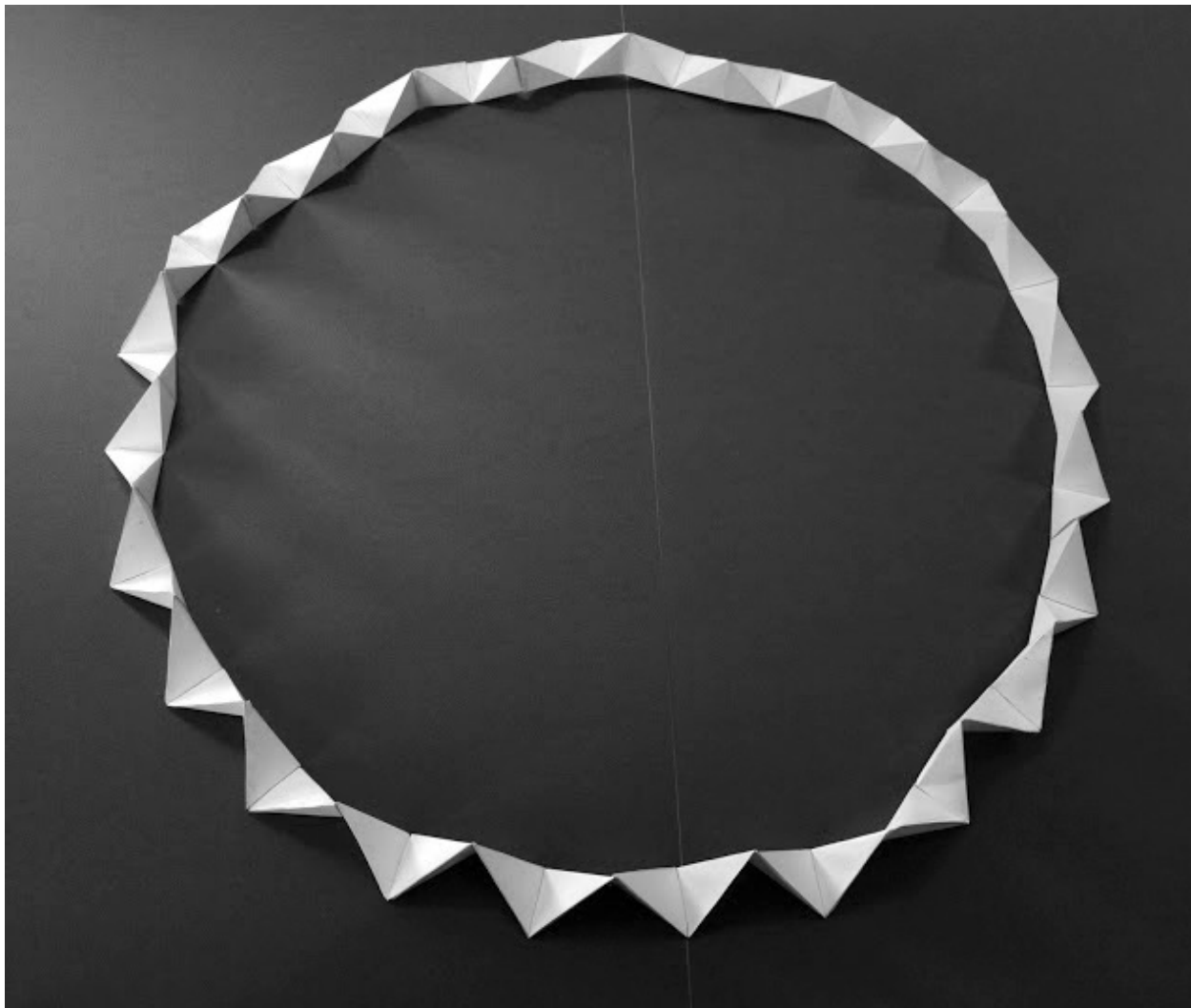
Scarpa, *Models of Rotational Geometry*
pp. 76–77



(L. Bocca, model replica, 2014)



(L. Bocca, model replica, 2014)



Scarpa, *Models of Rotational Geometry*, pp. 87–92



RECENT MODELS AND DEVELOPMENTS

MODELLI DI BIONICA

Capire la natura attraverso i modelli

a cura di Giorgio Scarpa



Giorgio Scarpa, presentation of Aristotle's Lantern. Faenza, c. 1980

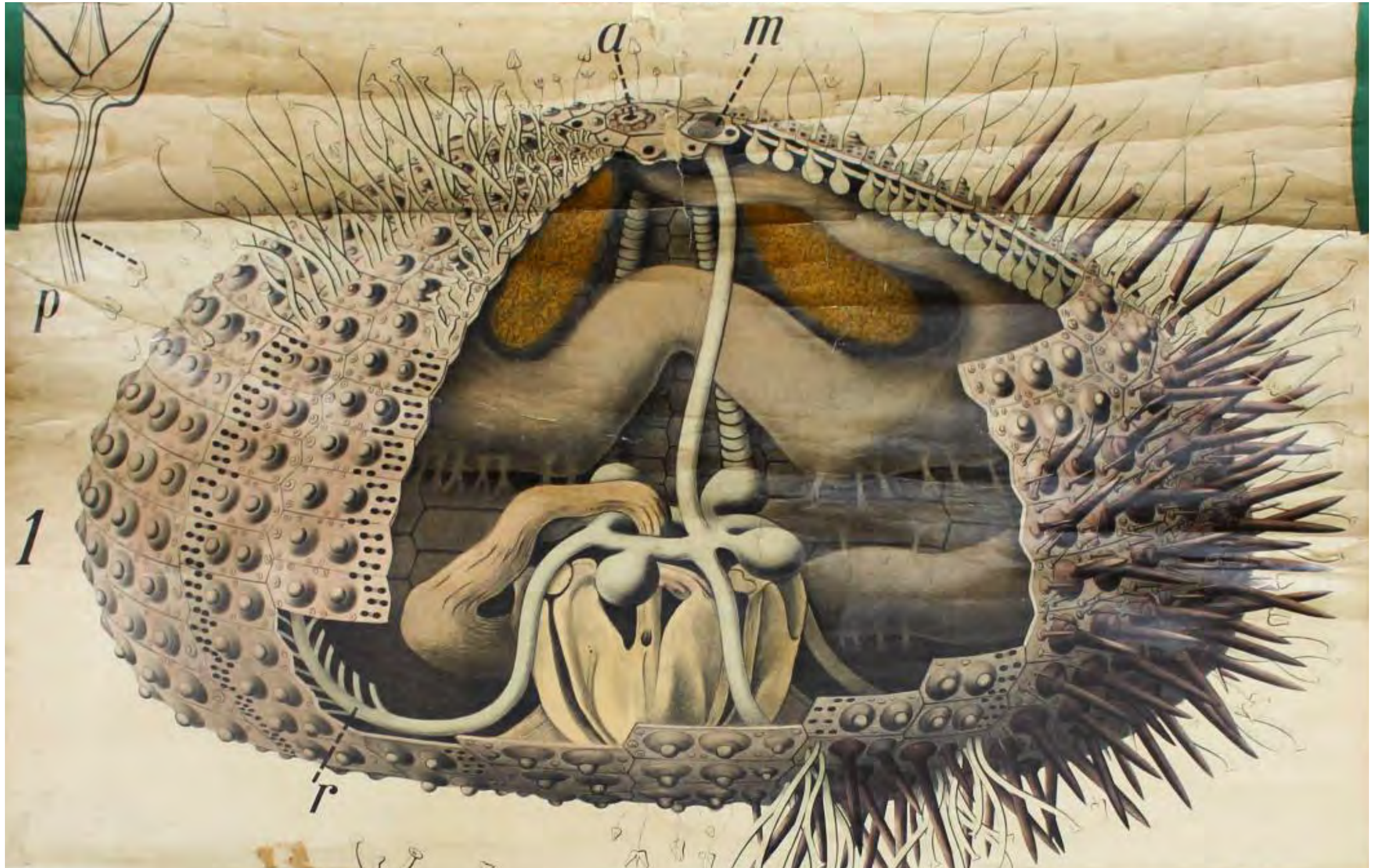
“To play (to explore) is something that costs nothing and brings the mind closer to its desires by asking about the goals and function of every choice, so that every project, before it even becomes an application in its diversified specificity, every project should mean freedom and spontaneity in making, a non-paralyzing immersion, a contrast to what surrounds us, in a seamless process. (...) The image of destroyed sea urchins, their scattered fragments in the sand, and of the live sea urchins observed in their marine habitat, are the source of this study. (...) Not a single sea urchin was sacrificed in order to study it.”

Giorgio Scarpa, c. 1970



Lantern replicant 2. Delft, NL, 19 Oct. 2017
(Replica constructed by Pino Trogu)





[Chart Sea Urchin by Paul Pfurtscheller, 1907: https://www.pamono.com/antique-wall-chart-sea-urchin-by-paul-pfurtscheller-1907-1](https://www.pamono.com/antique-wall-chart-sea-urchin-by-paul-pfurtscheller-1907-1)



Photo: Giorgio Cireddu

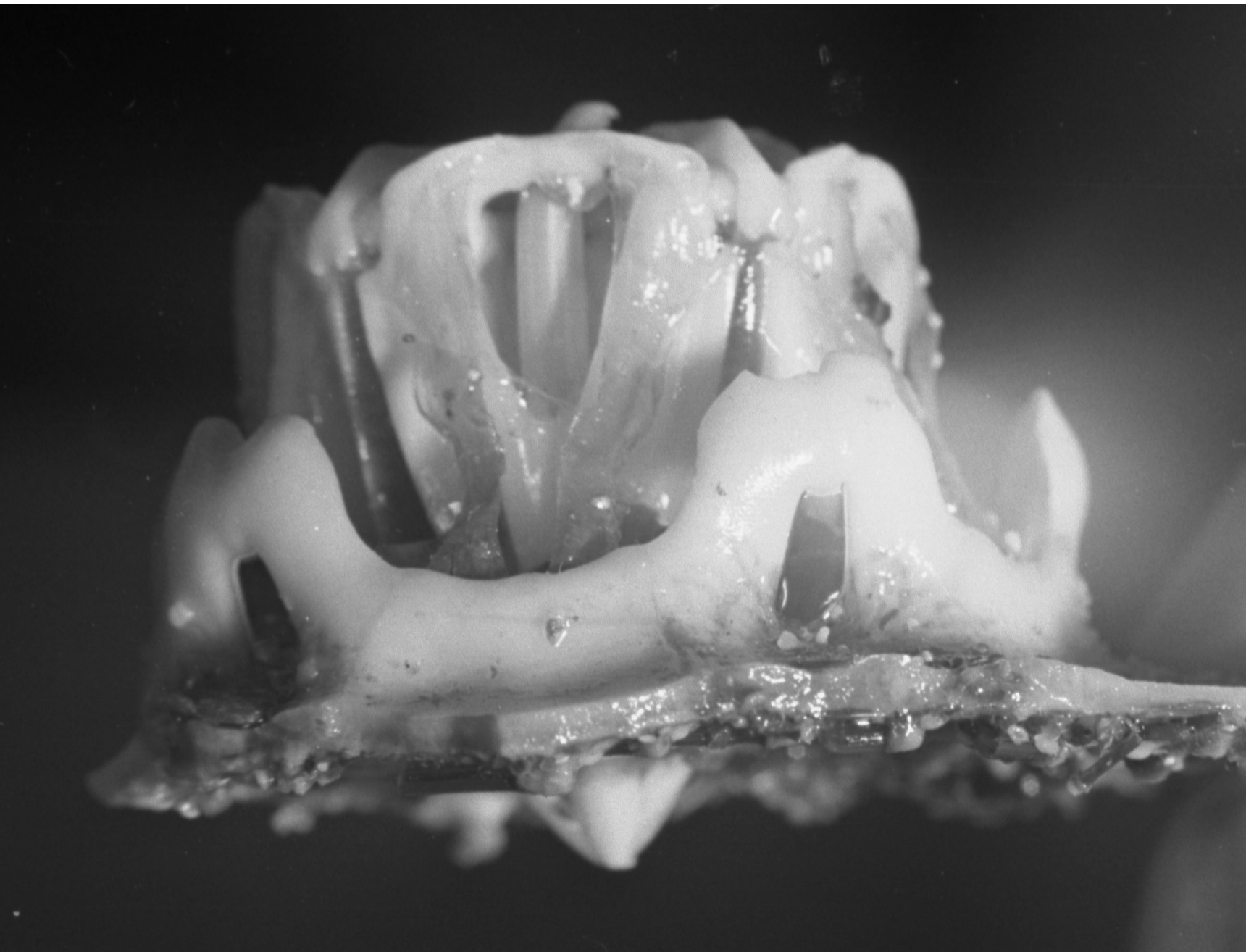
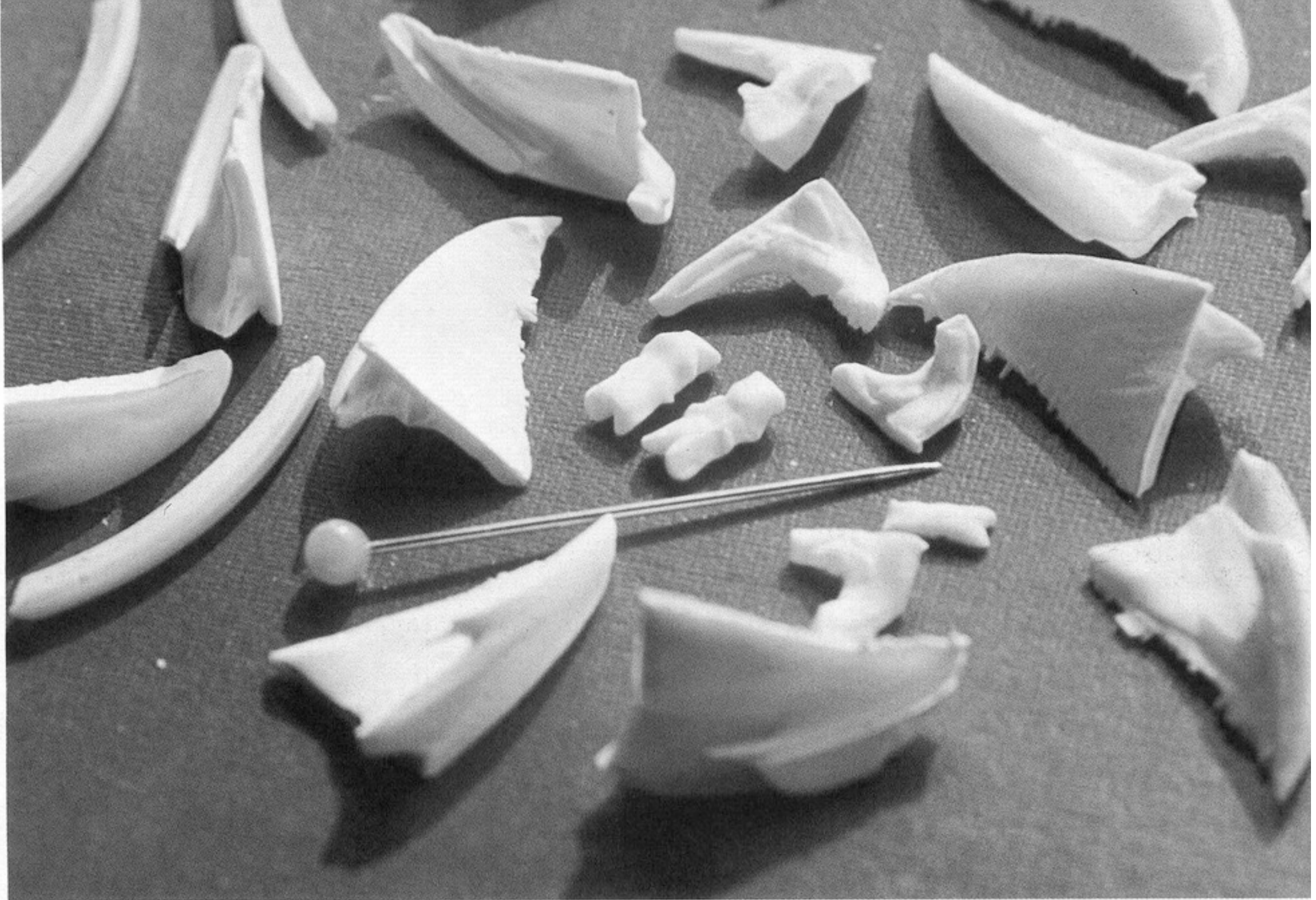


Photo: Giorgio Cireddu



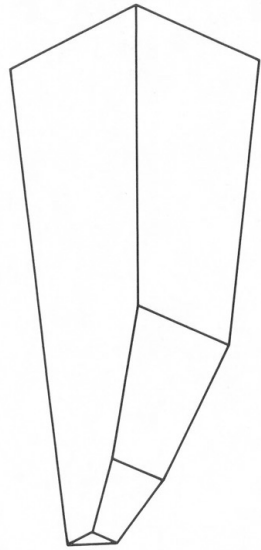
Drawing by Giorgio Scarpa



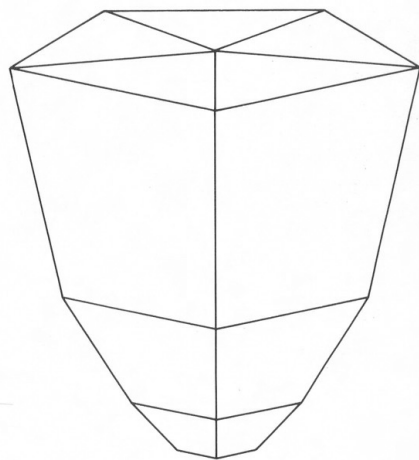


Calcareous pieces which form the skeletal structure. The pin shows the dimensions of the parts.

Scarpa, Giorgio, Modelli di bionica: capire la natura attraverso i modelli. Quaderni di design 13, ed. B. Munari (Bologna: Zanichelli, 1985).

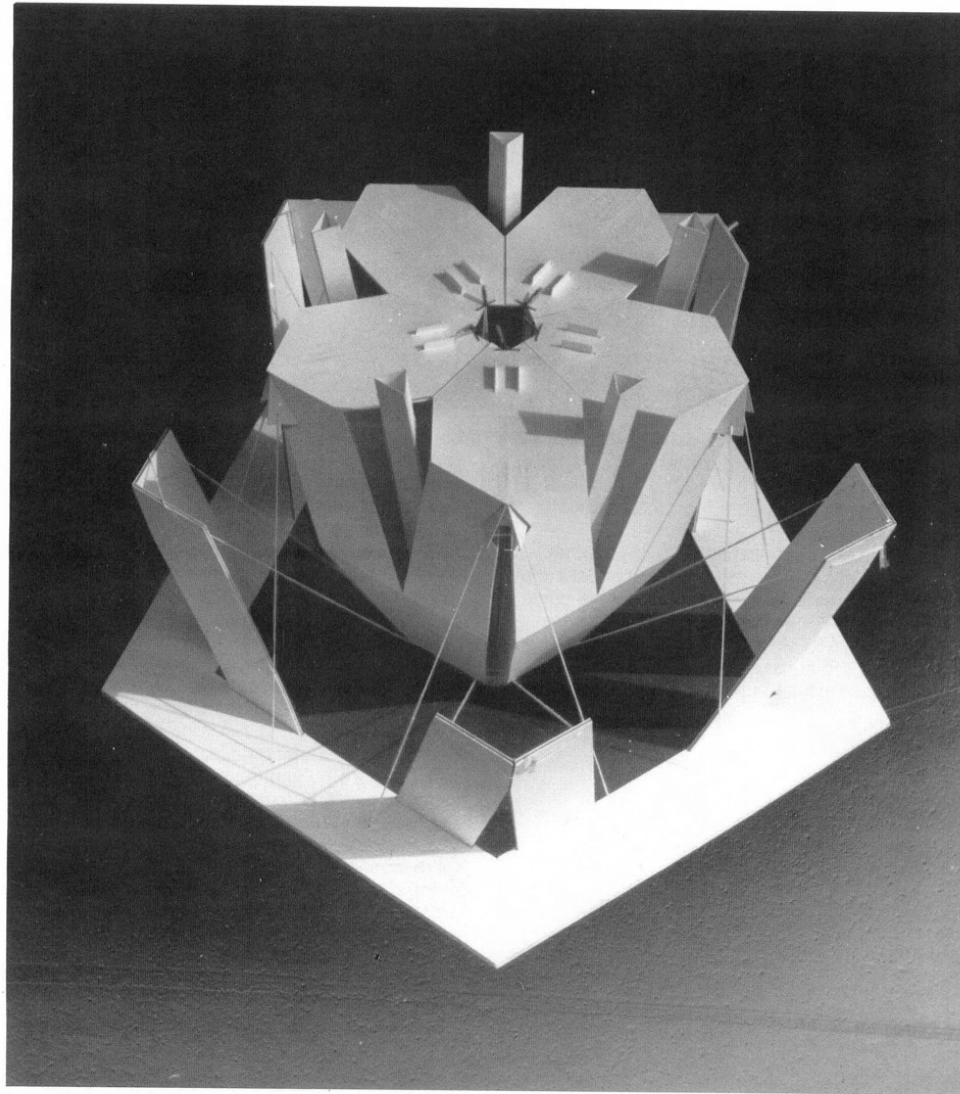


Drawing of a model of jaw.



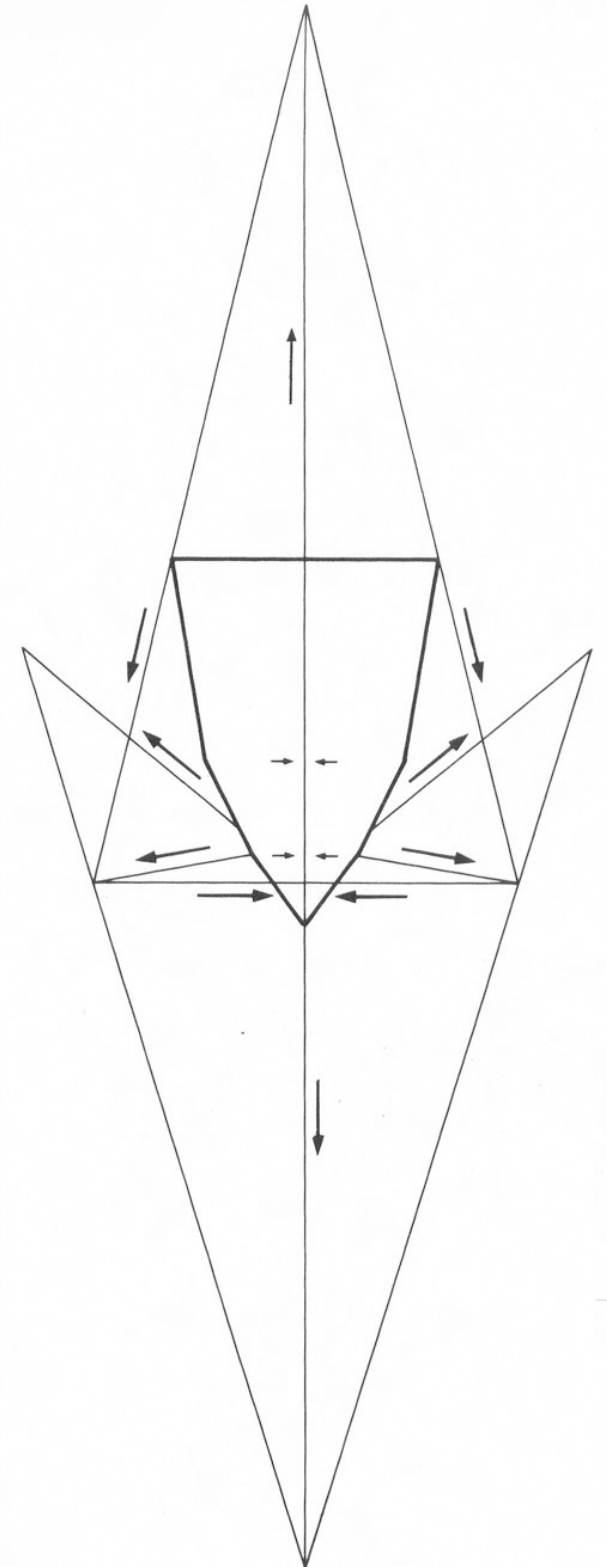
Five models combined together.

41



Overall model, complete with all the parts.

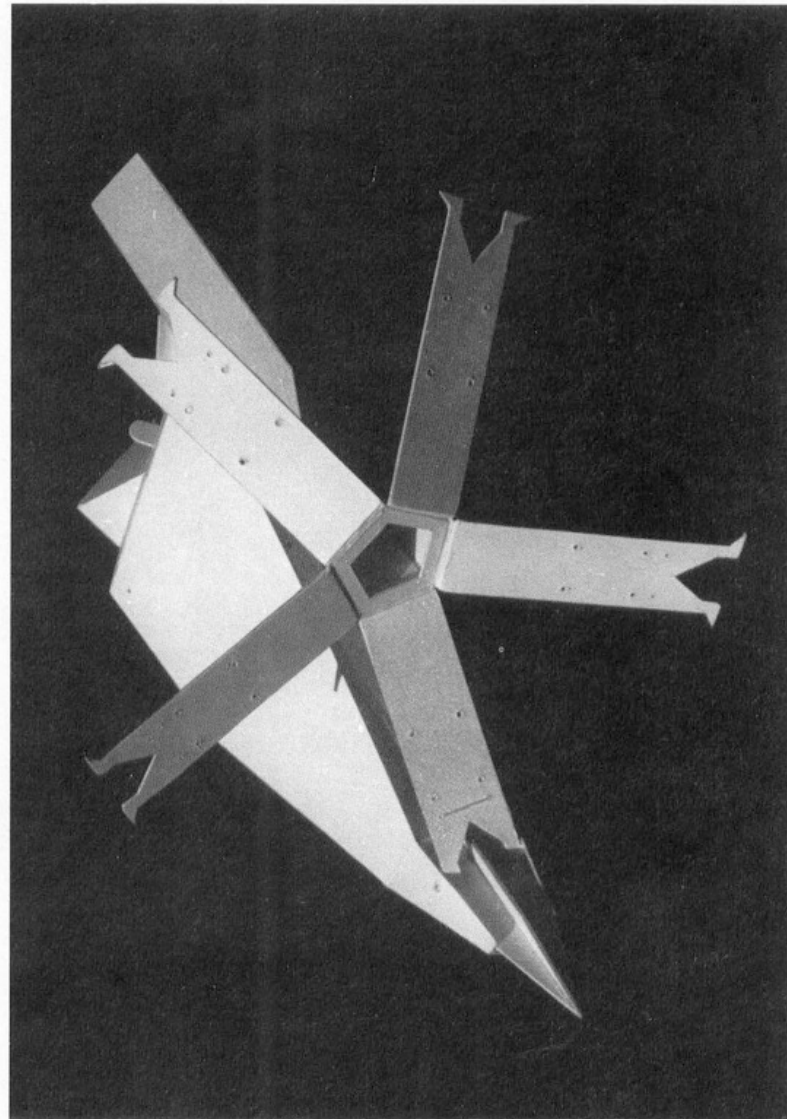
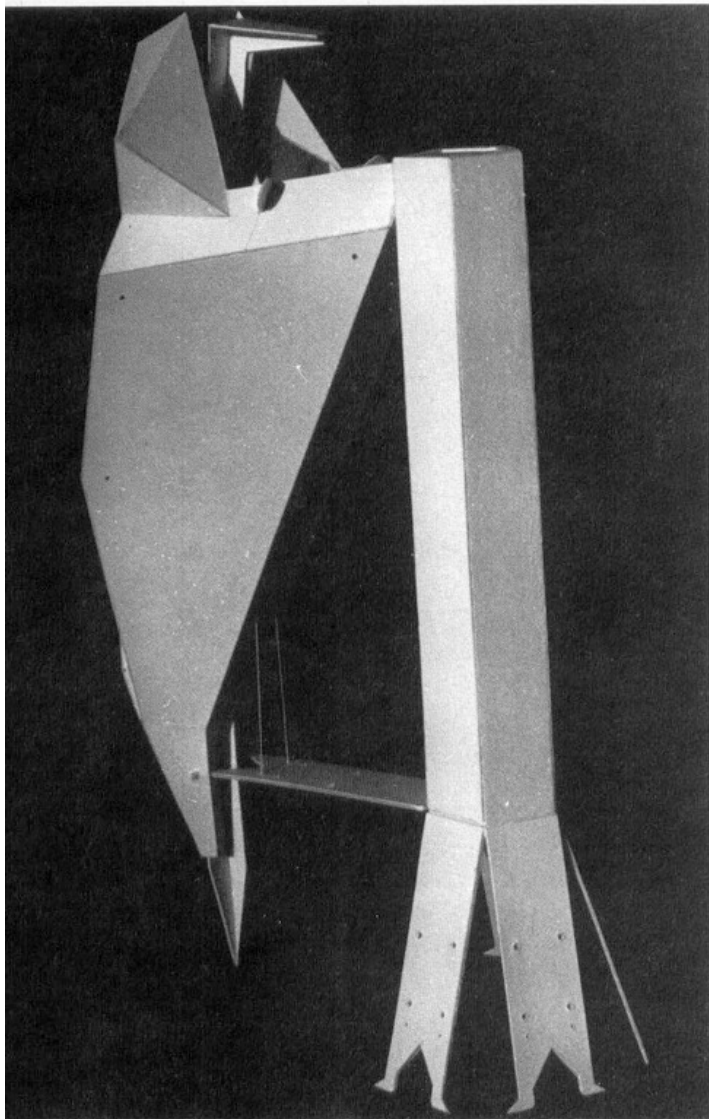
51



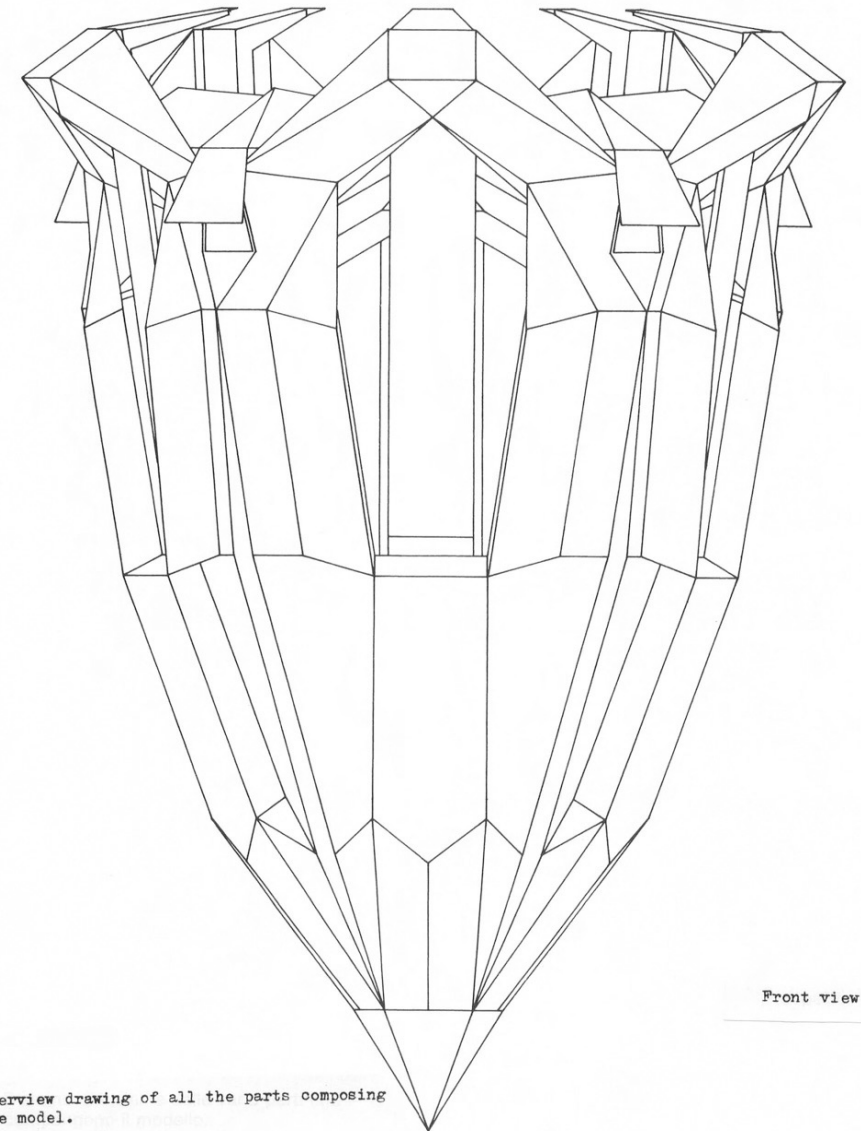
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Its vertex
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tensions t
can be var

Scarpa, Giorgio, Modelli di bionica, 1985.





Models of the pentagonal prism and the jaw, connected together.

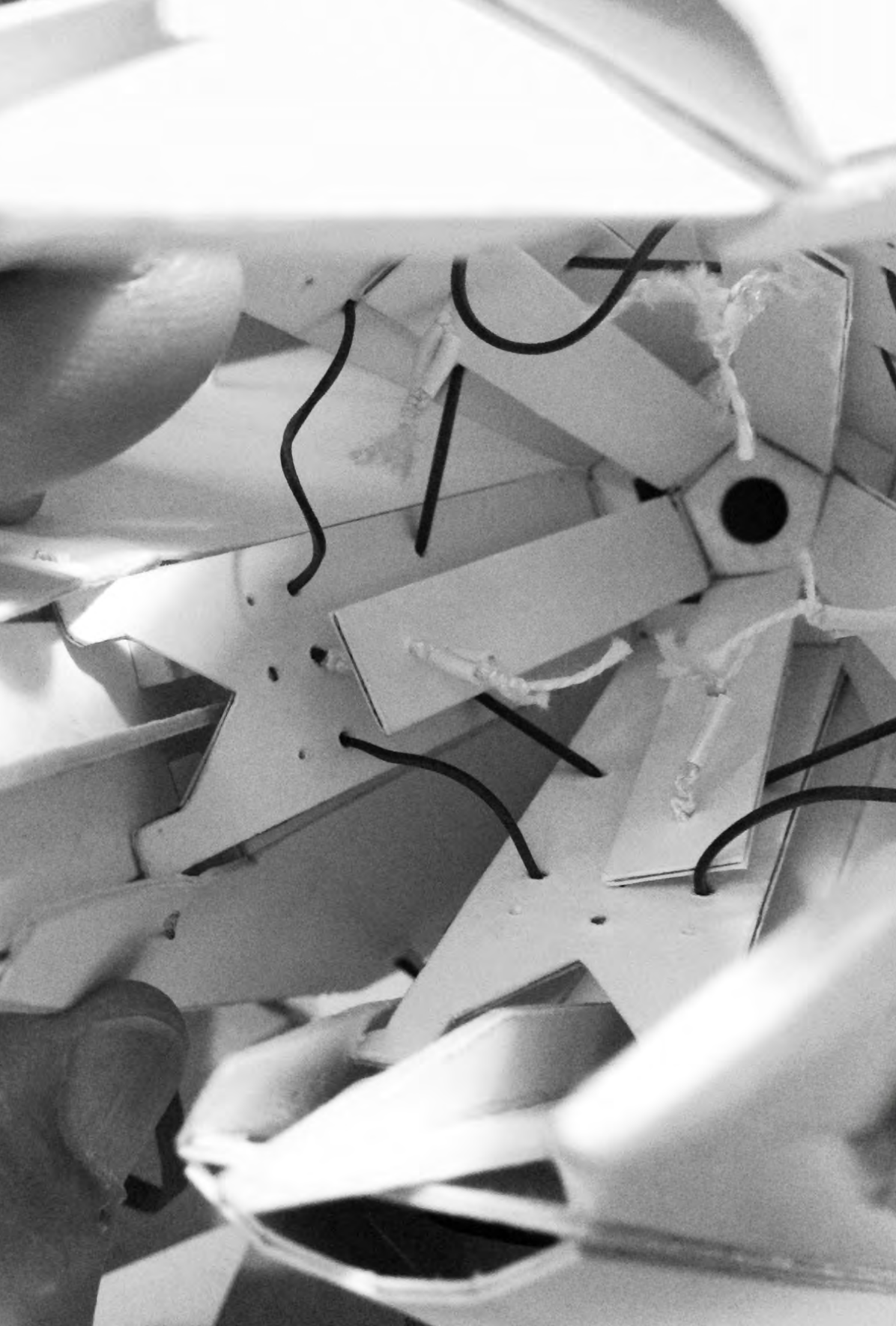


Overview drawing of all the parts composing the model.

Front view.

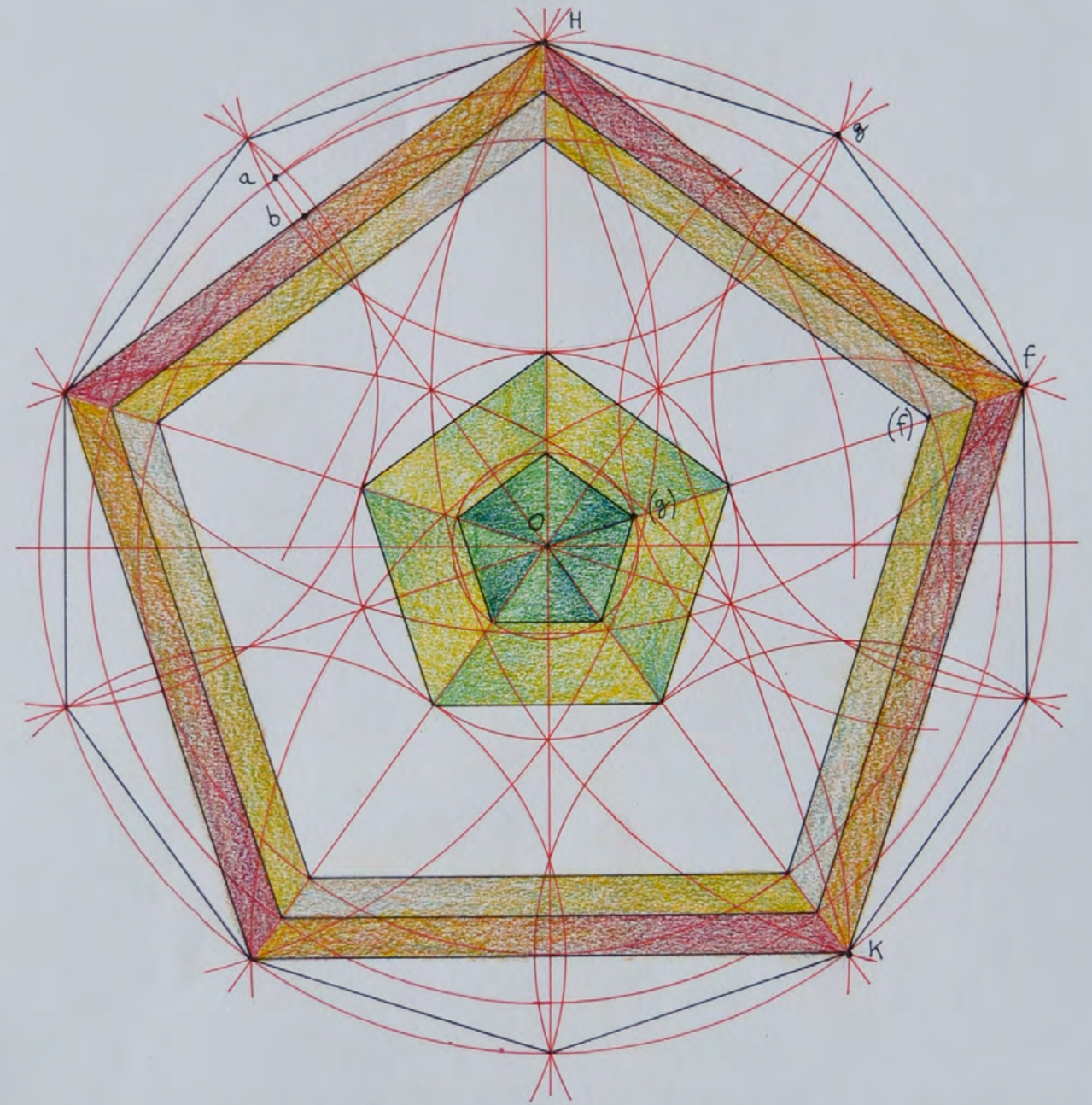
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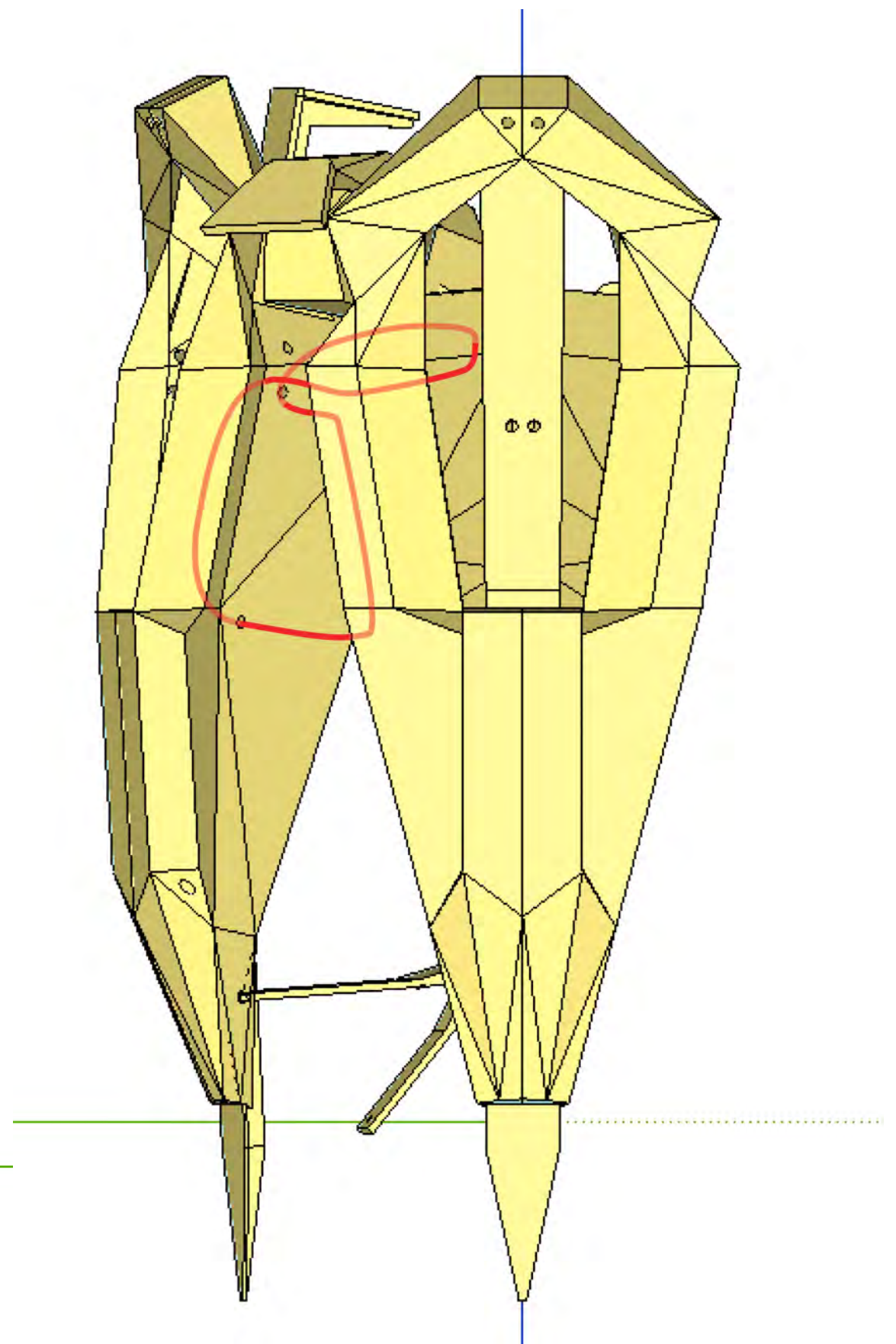
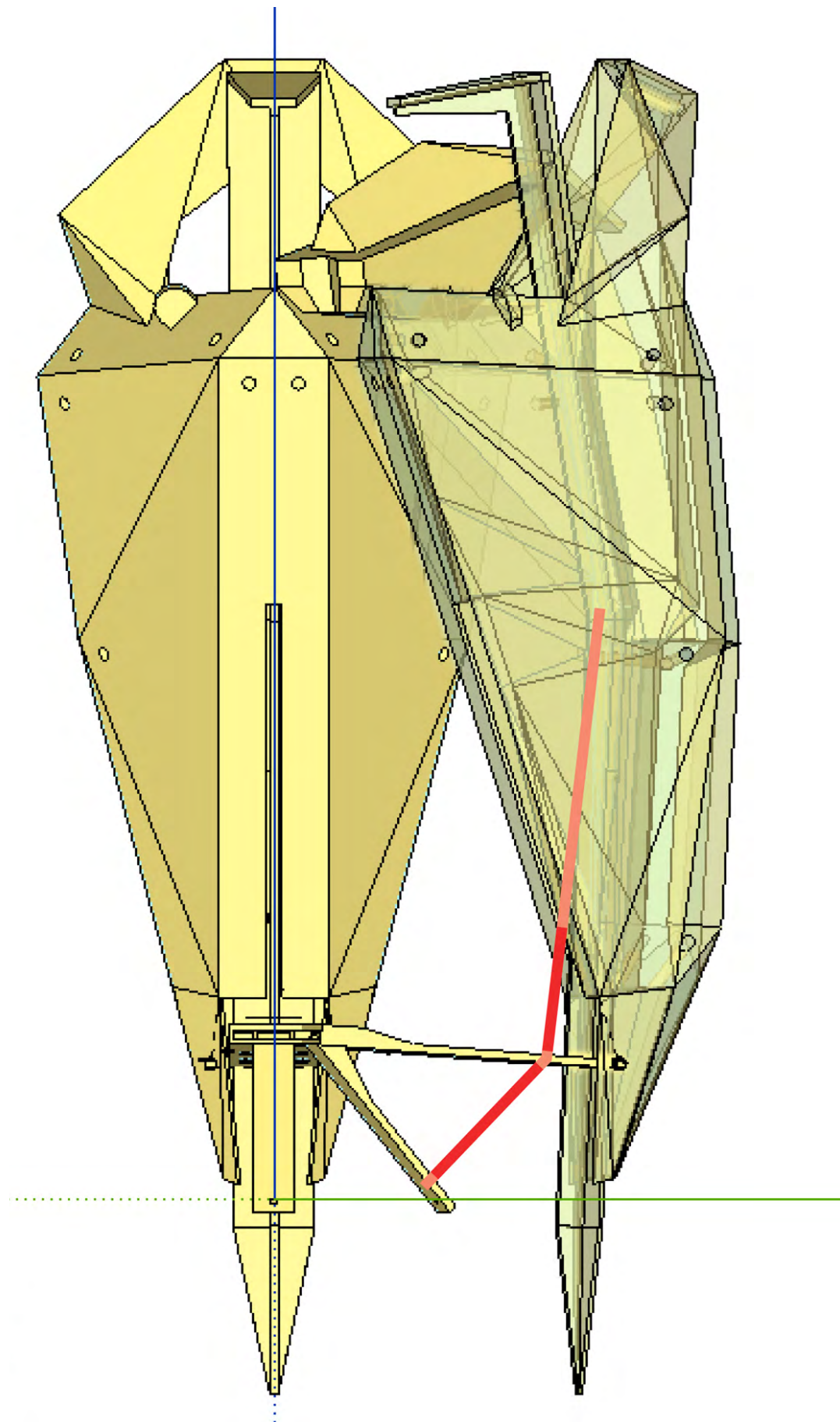
Scarpa, Giorgio, Modelli di bionica, 1985.



DETERMINAZIONE GEOMETRICA DEI PIANI ORIZZONTALI DEL MODELLO DELLA LANTERNA DI ARISTOTELE DI GIORGIO SCARPA

LORENZO BOCCA









[Bionic Model of Aristotle's Lantern by Giorgio Scarpa -- Youtube video](#)

Scarpa, Giorgio, Modelli di bionica, 1985.

GIORGIO SCARPA'S MODEL OF A SEA URCHIN INSPIRES NEW INSTRUMENTATION

LEONARDO JOURNAL
MIT PRESS, 2016

[PDF: static.trogu.com/documents/scarpa/leon_a_01384.pdf](http://static.trogu.com/documents/scarpa/leon_a_01384.pdf)

Trogu, 2016
Leonardo Just Accepted MS.
doi: 10.1162/LEON_a_01384
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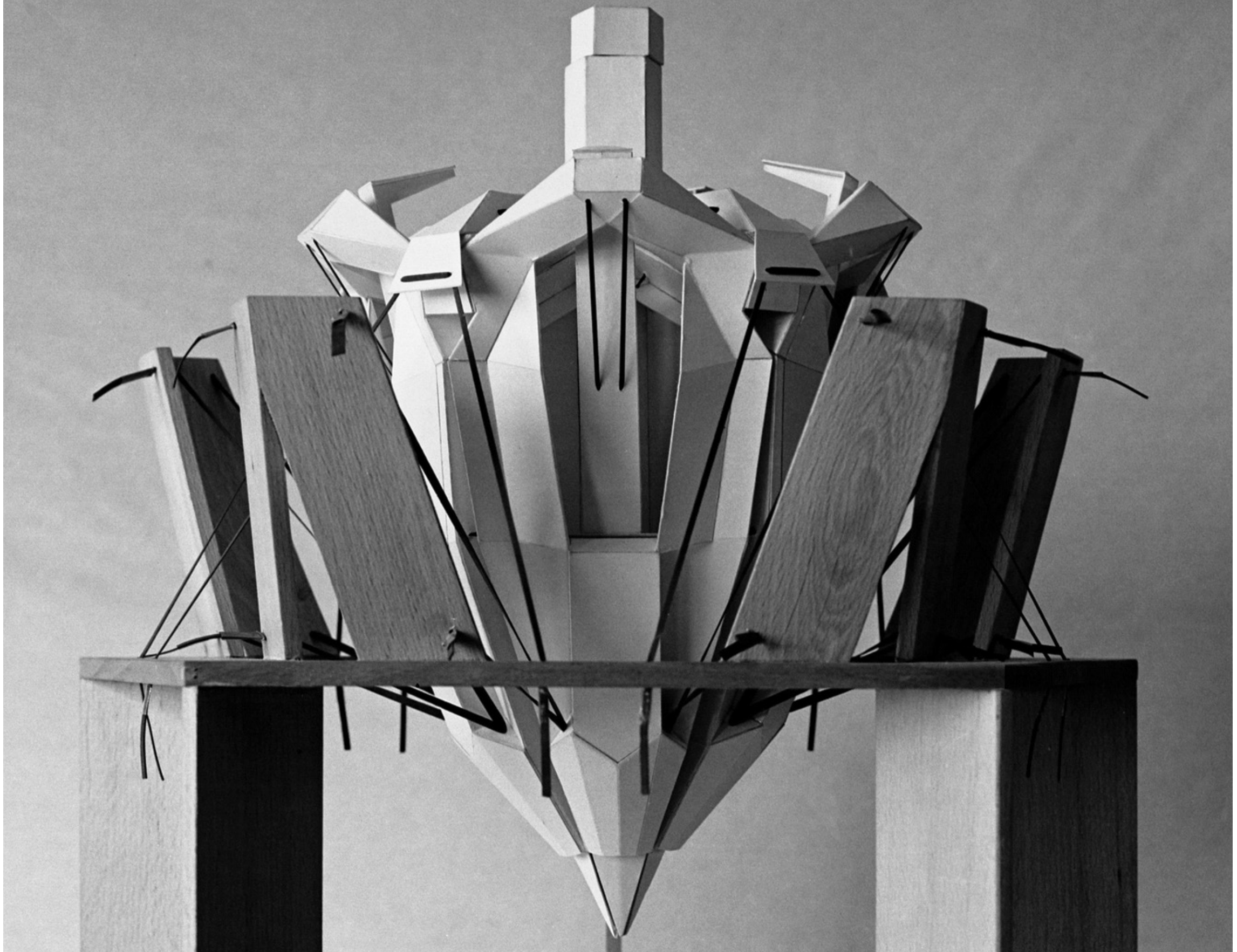


Photo: Giorgio Cireddu

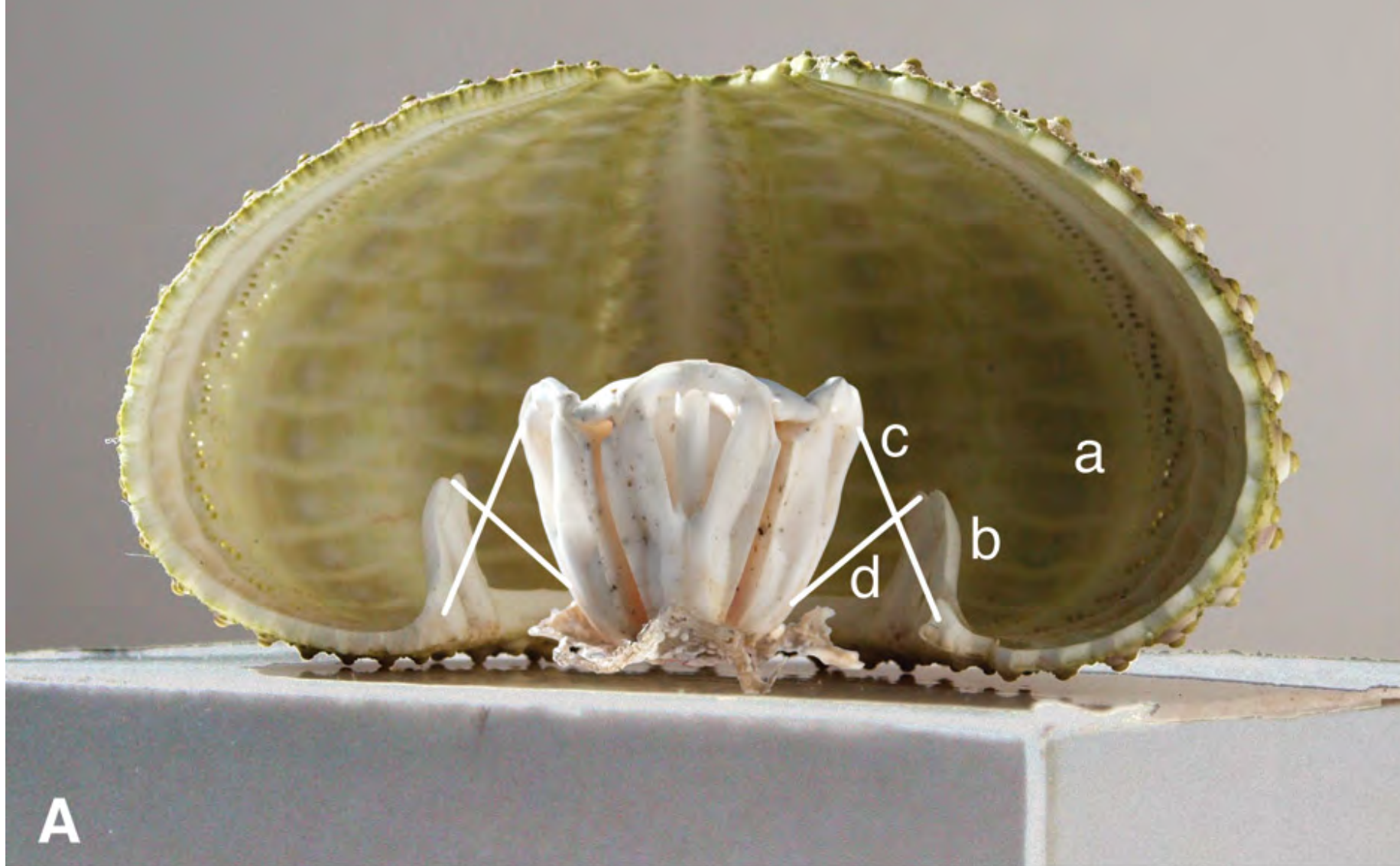


Photo: Giorgio Cireddu

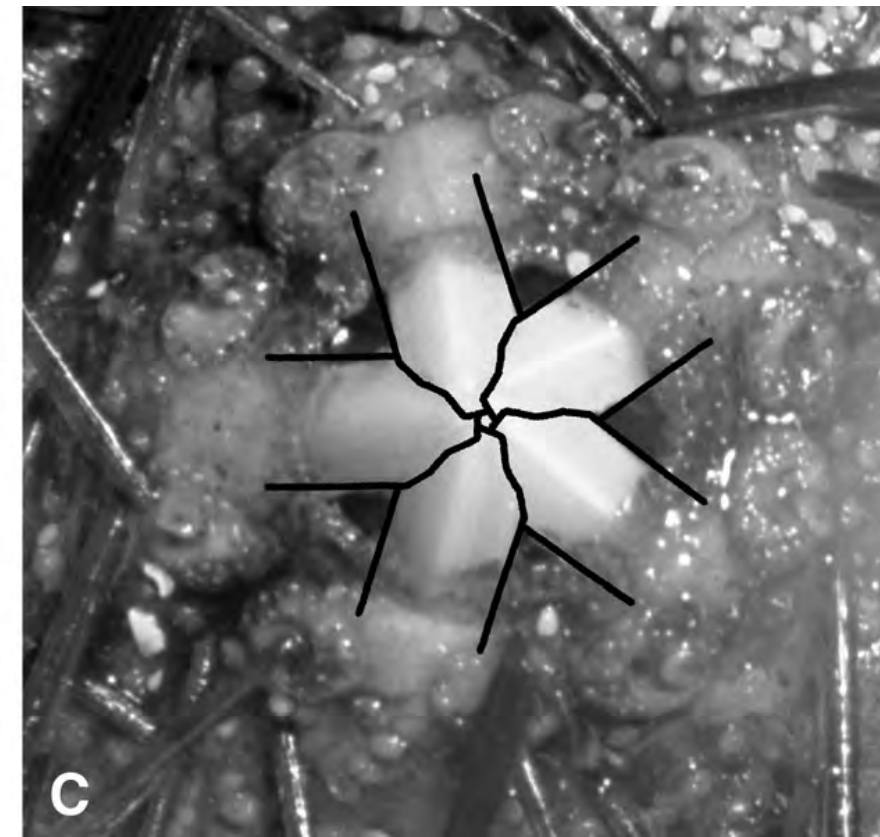
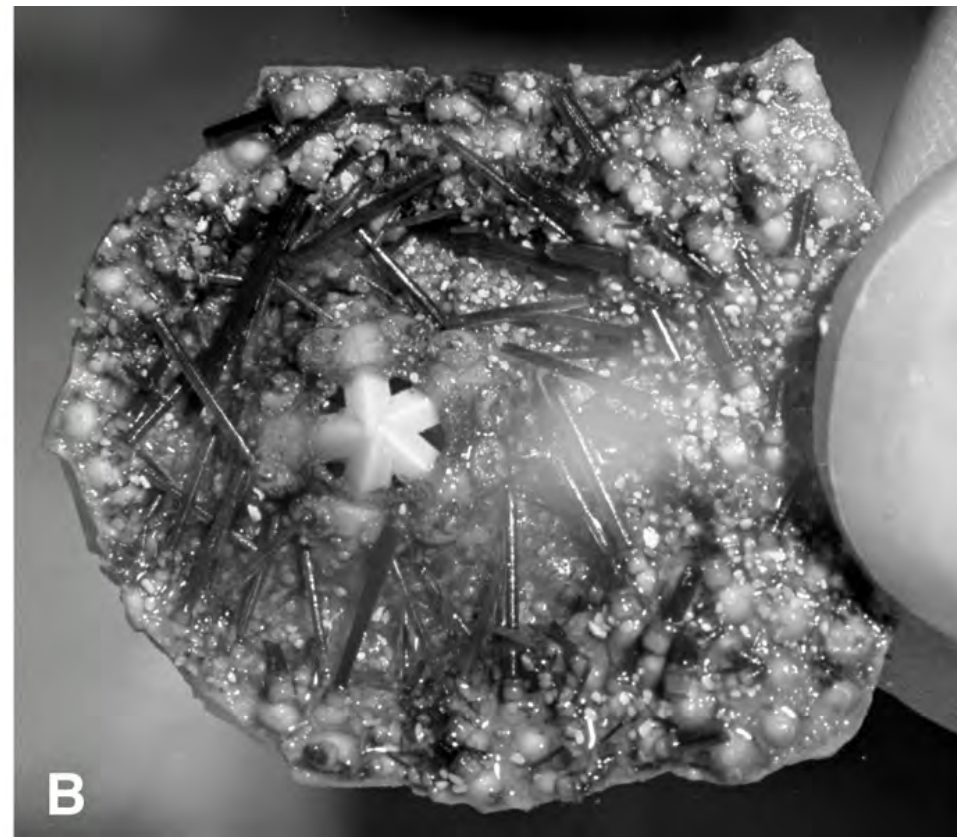
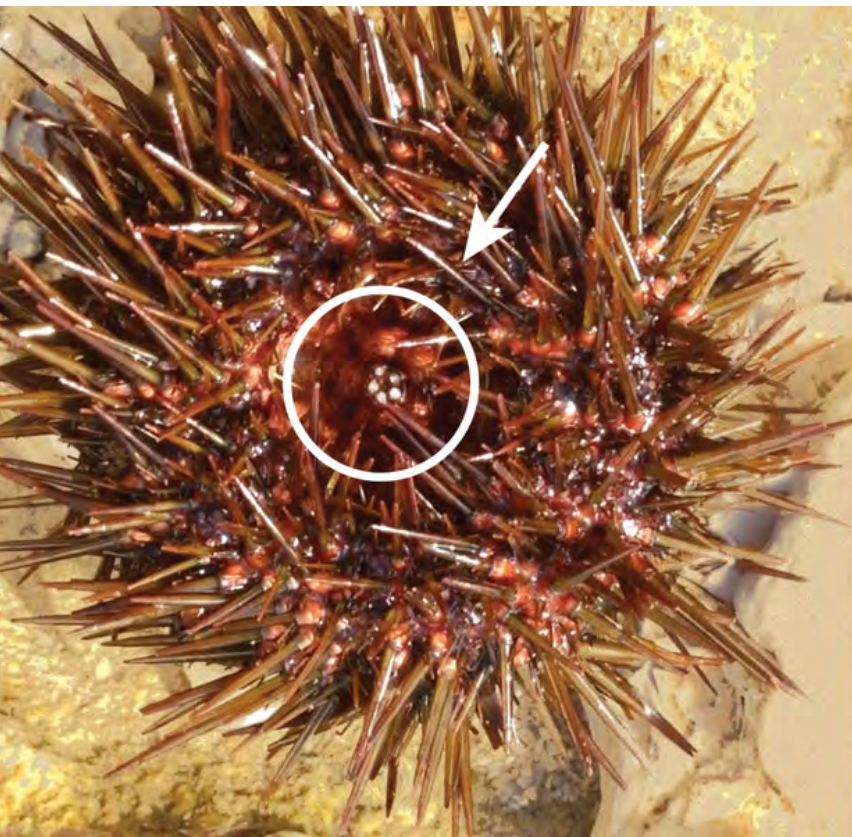
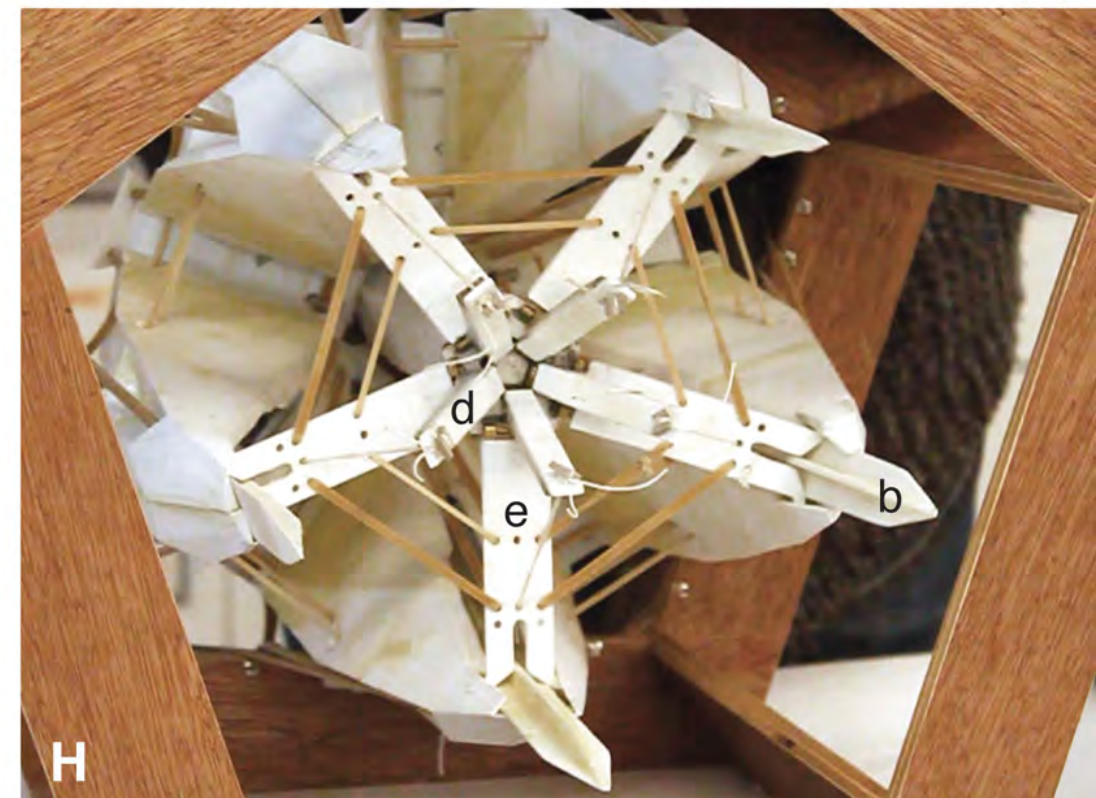
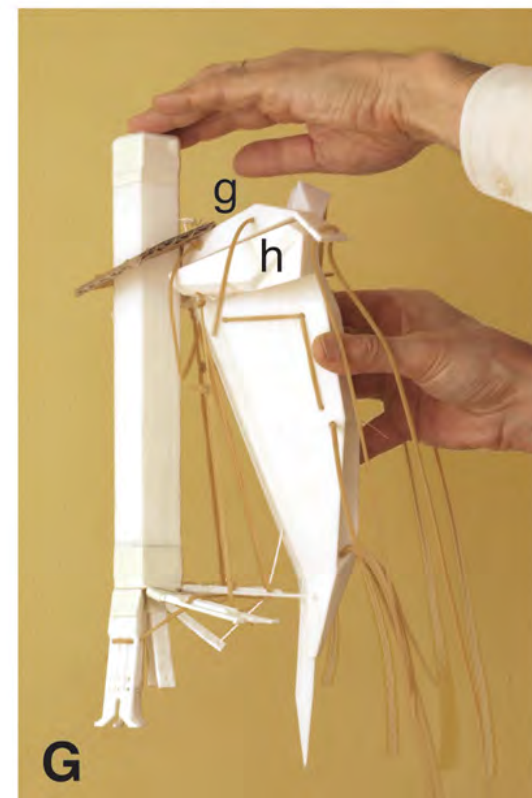
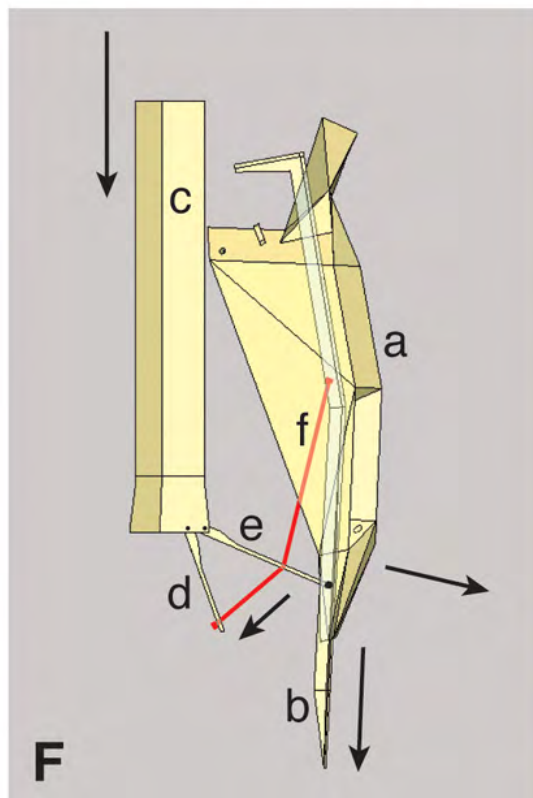
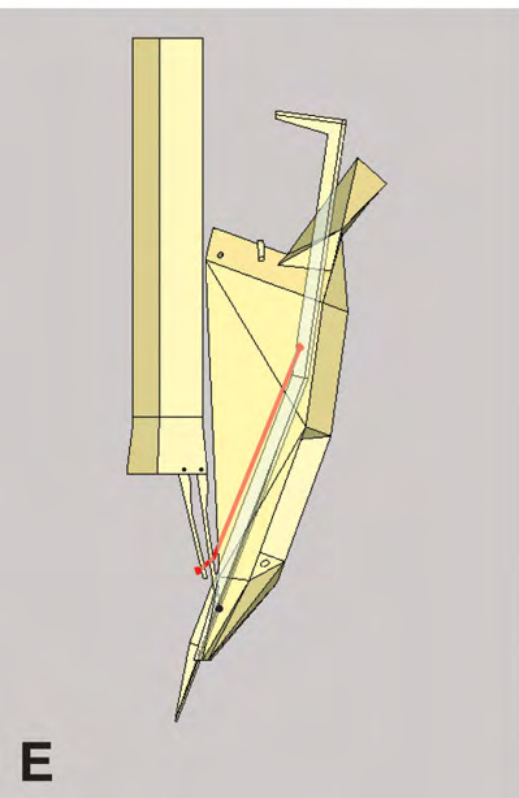
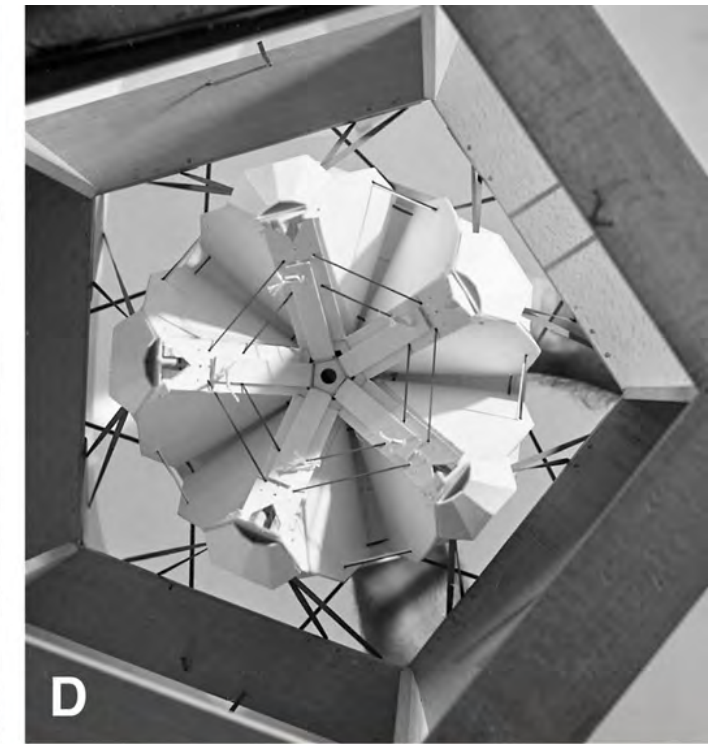
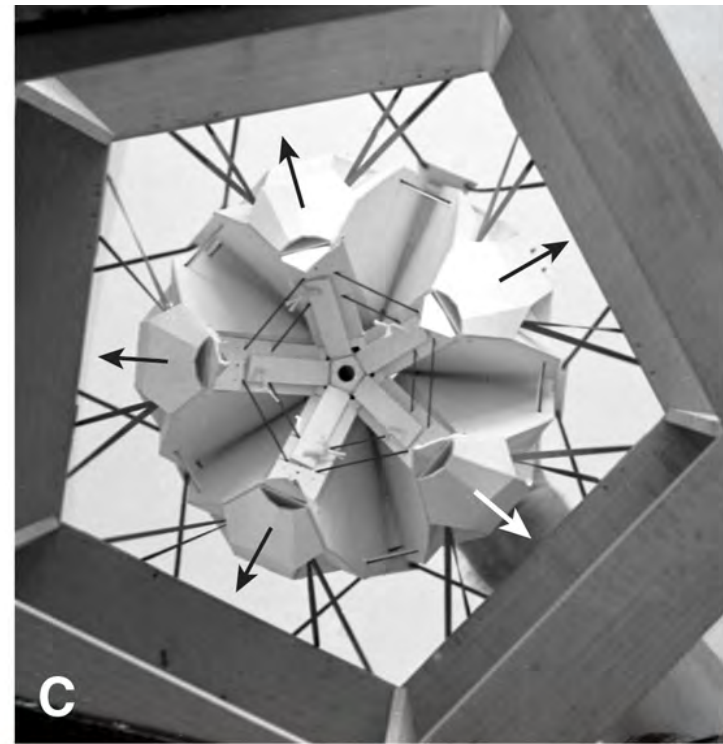
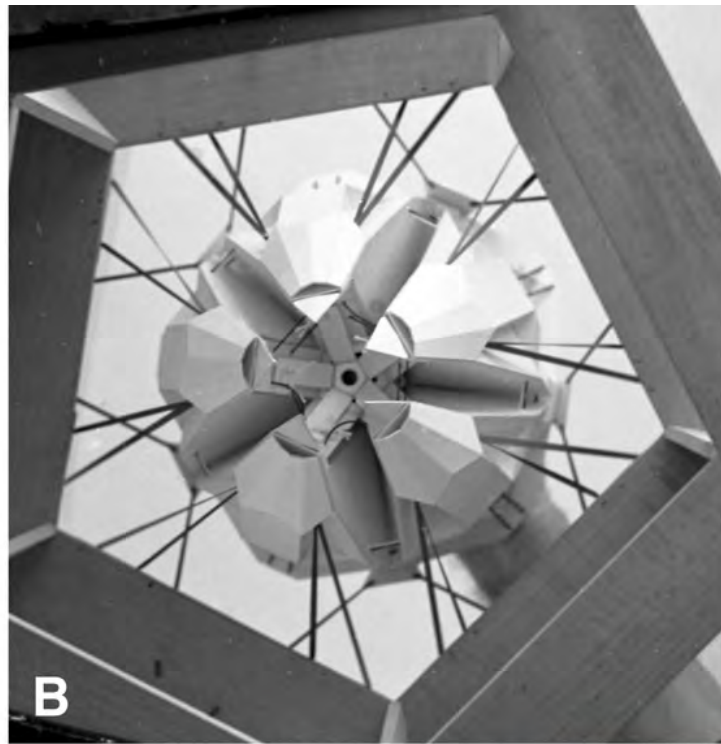
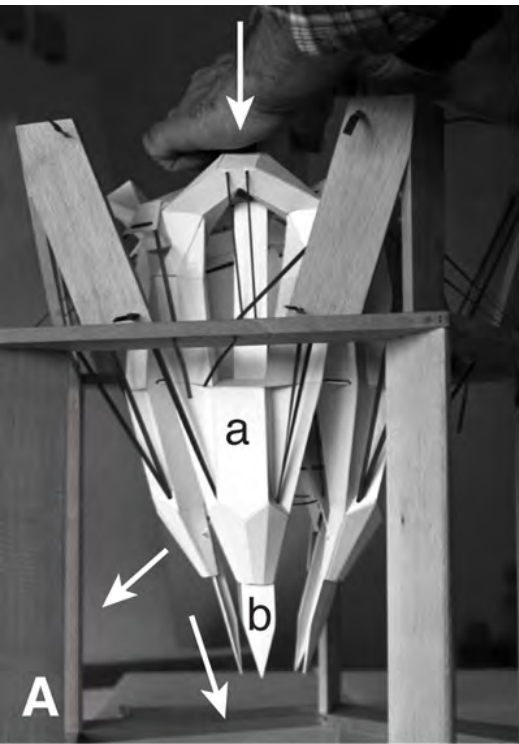


Photo: Giorgio Cireddu



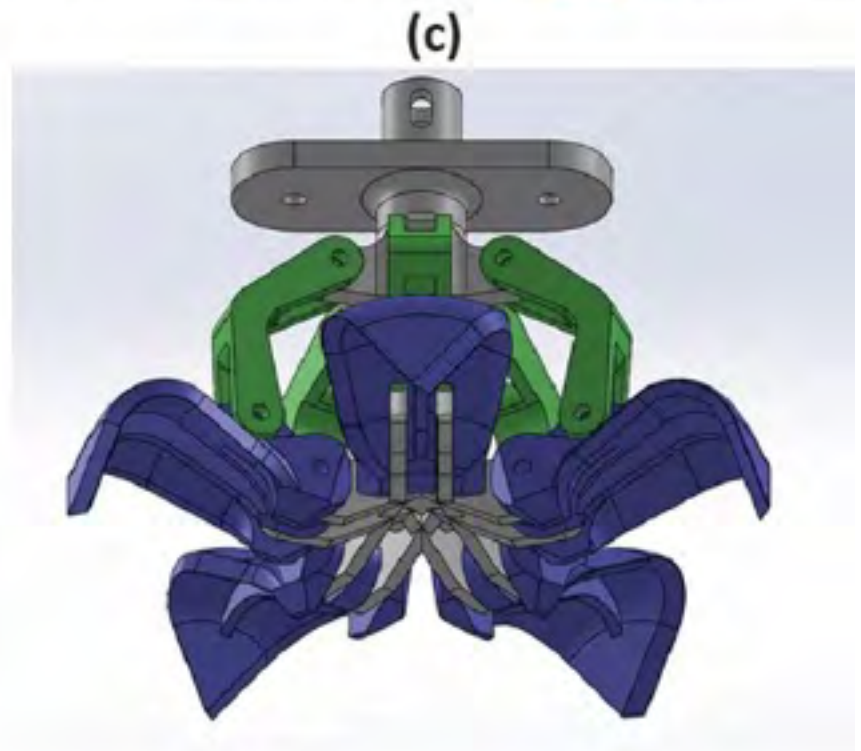
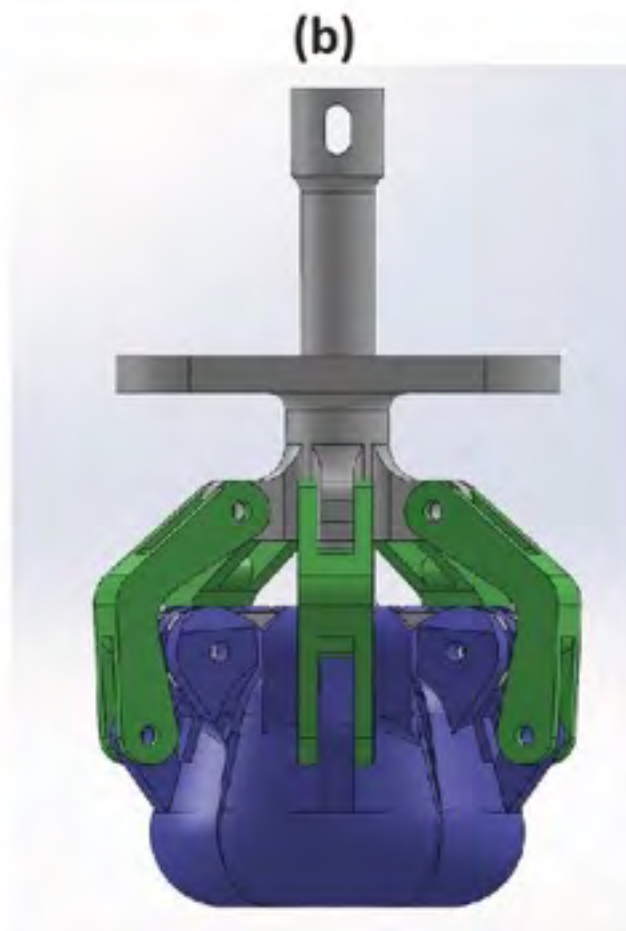
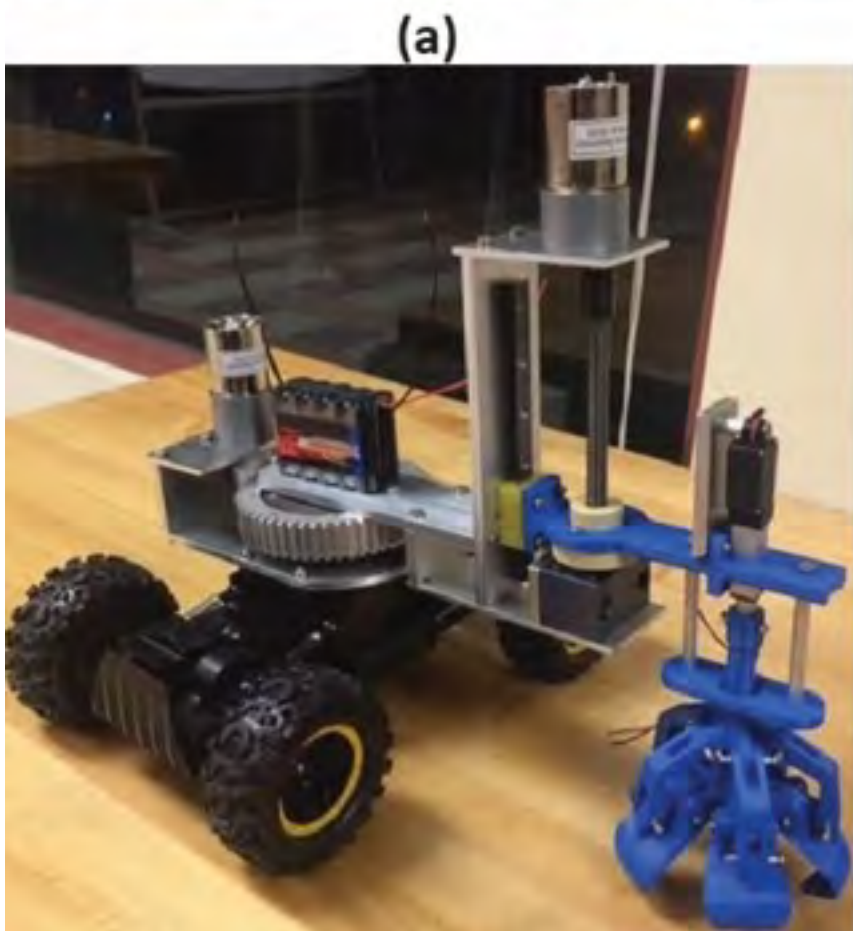
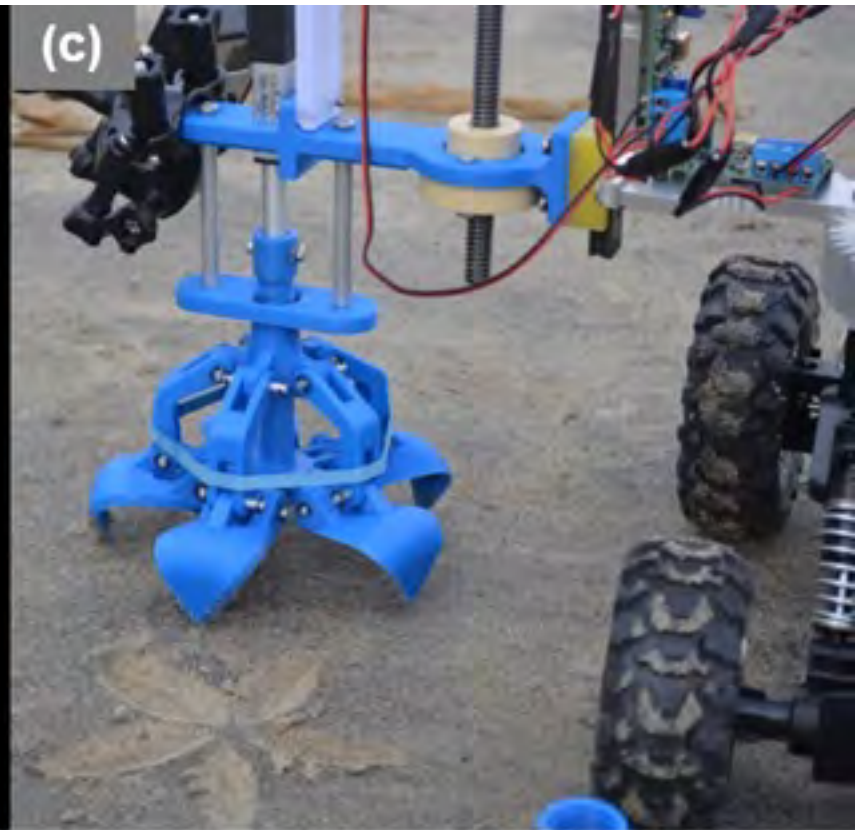
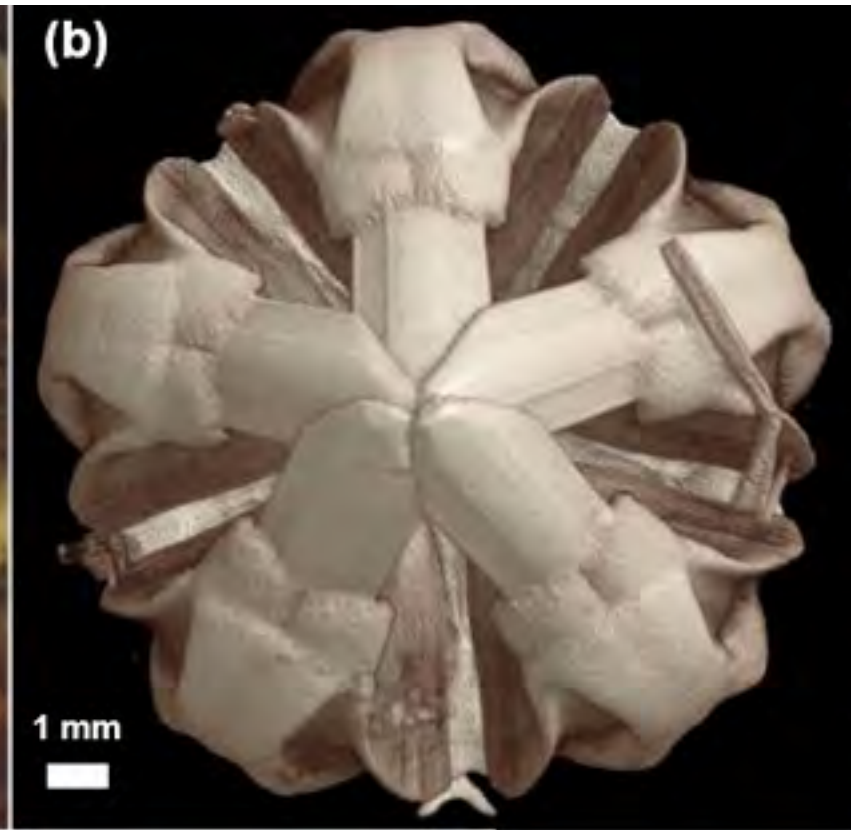
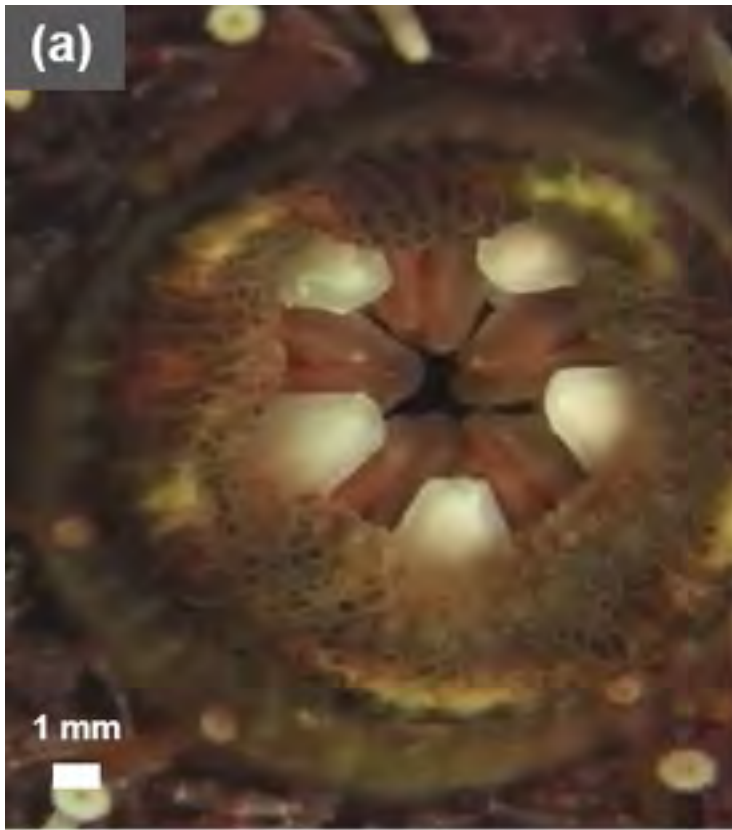
GROUND SAMPLER

FRANK ET AL.

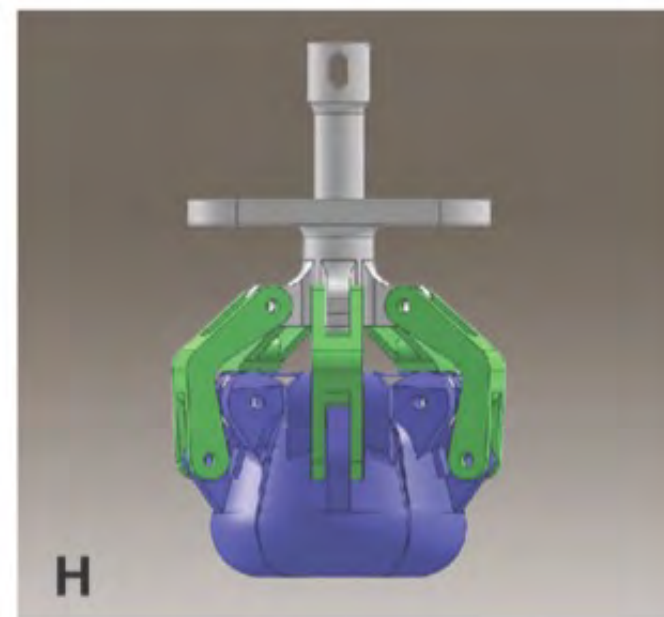
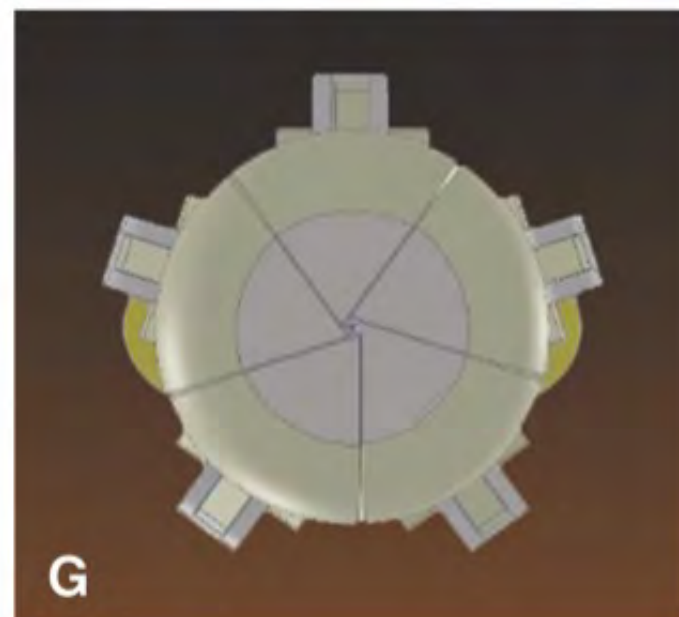
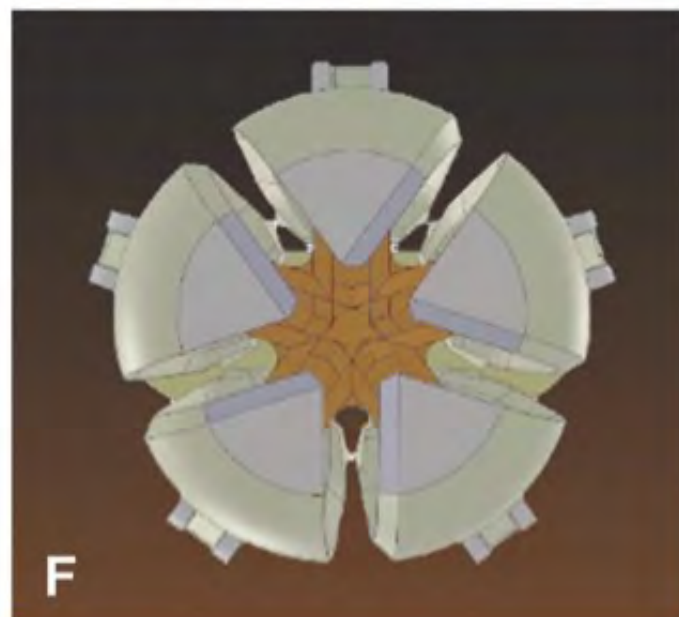
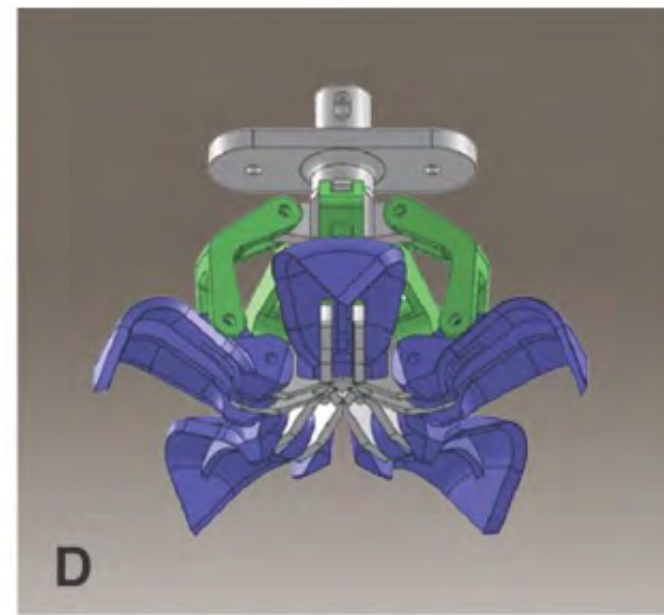
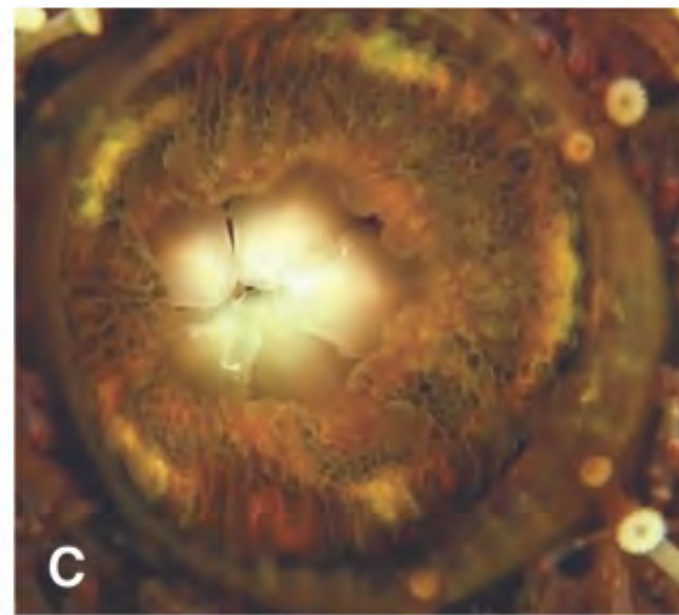
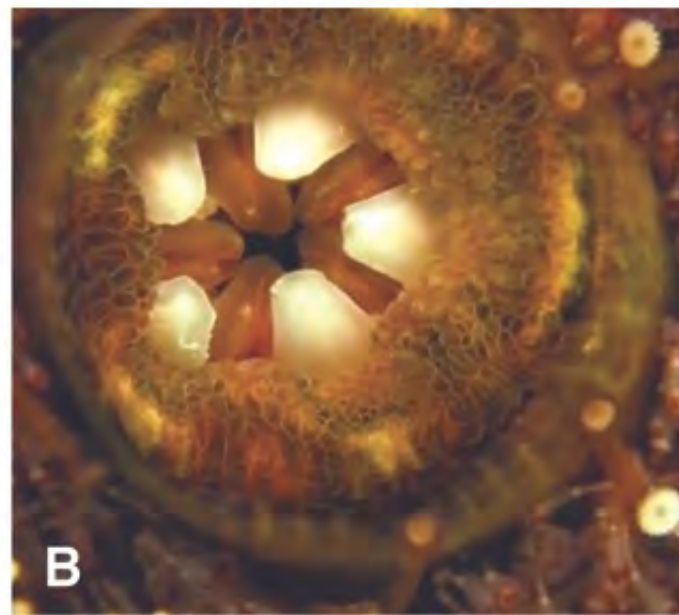
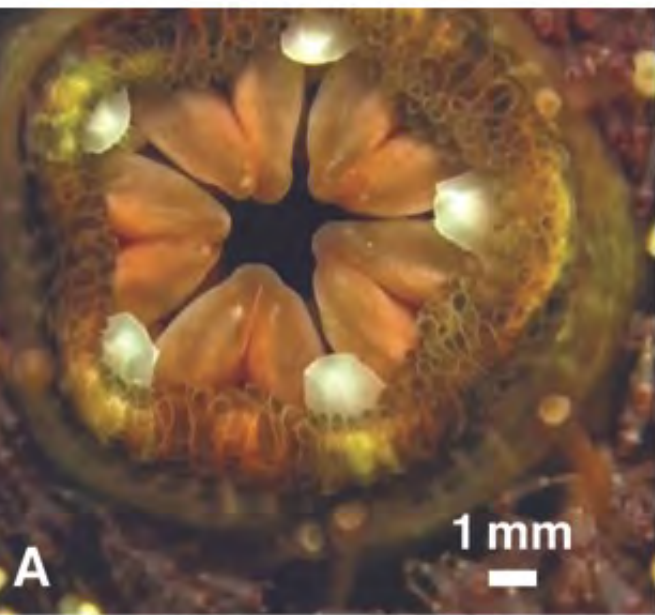
UNIVERSITY OF CALIFORNIA

SANTA CRUZ (UCSC)

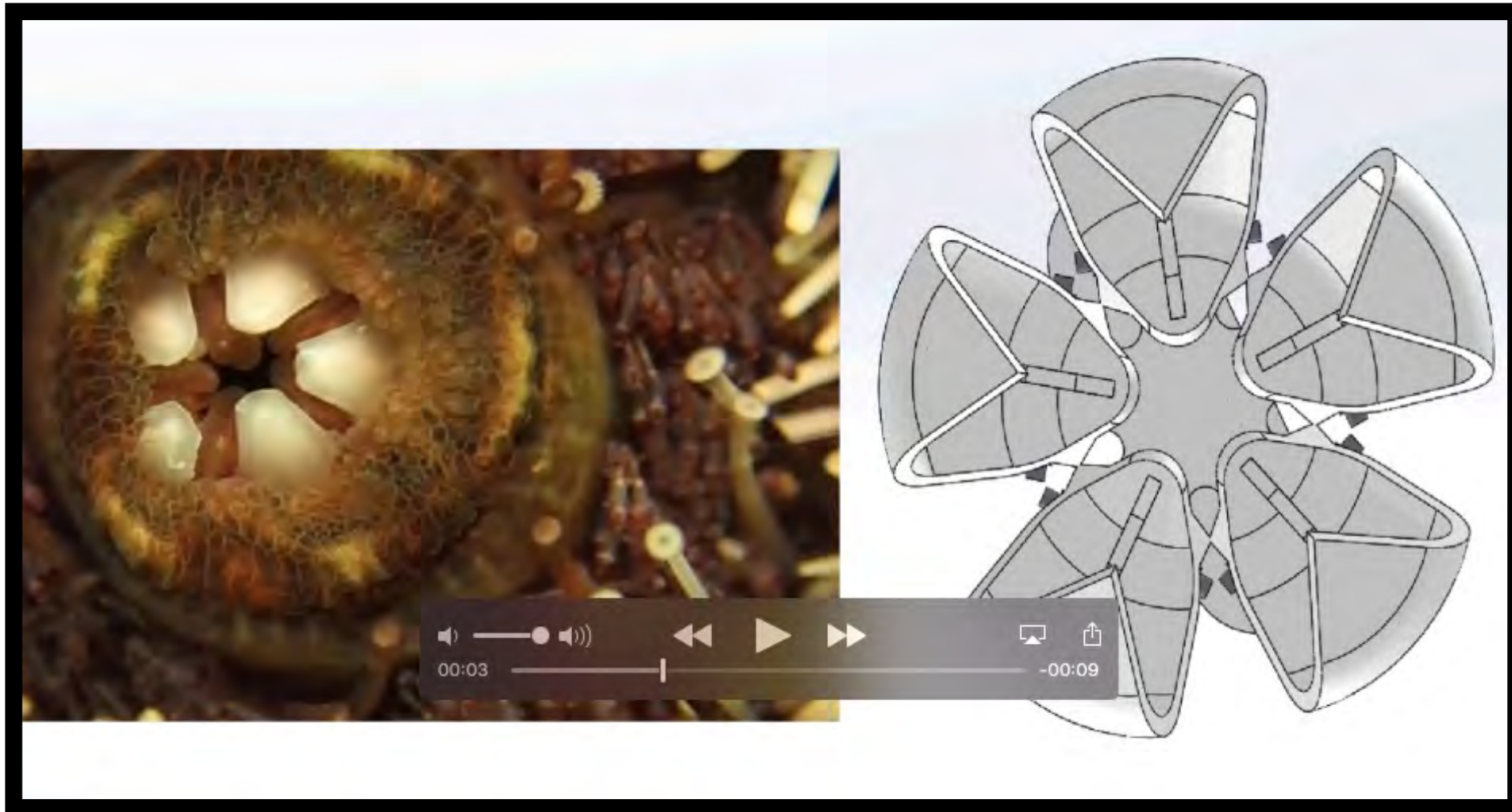
(Frank et al, UC San Diego, 2015)



(Frank et al, UC San Diego, 2015)



(Frank et al, UC San Diego, 2015)



[Frank et al., UCSD urchin side-by-side video](#)

(Frank et al, UC San Diego, 2015)

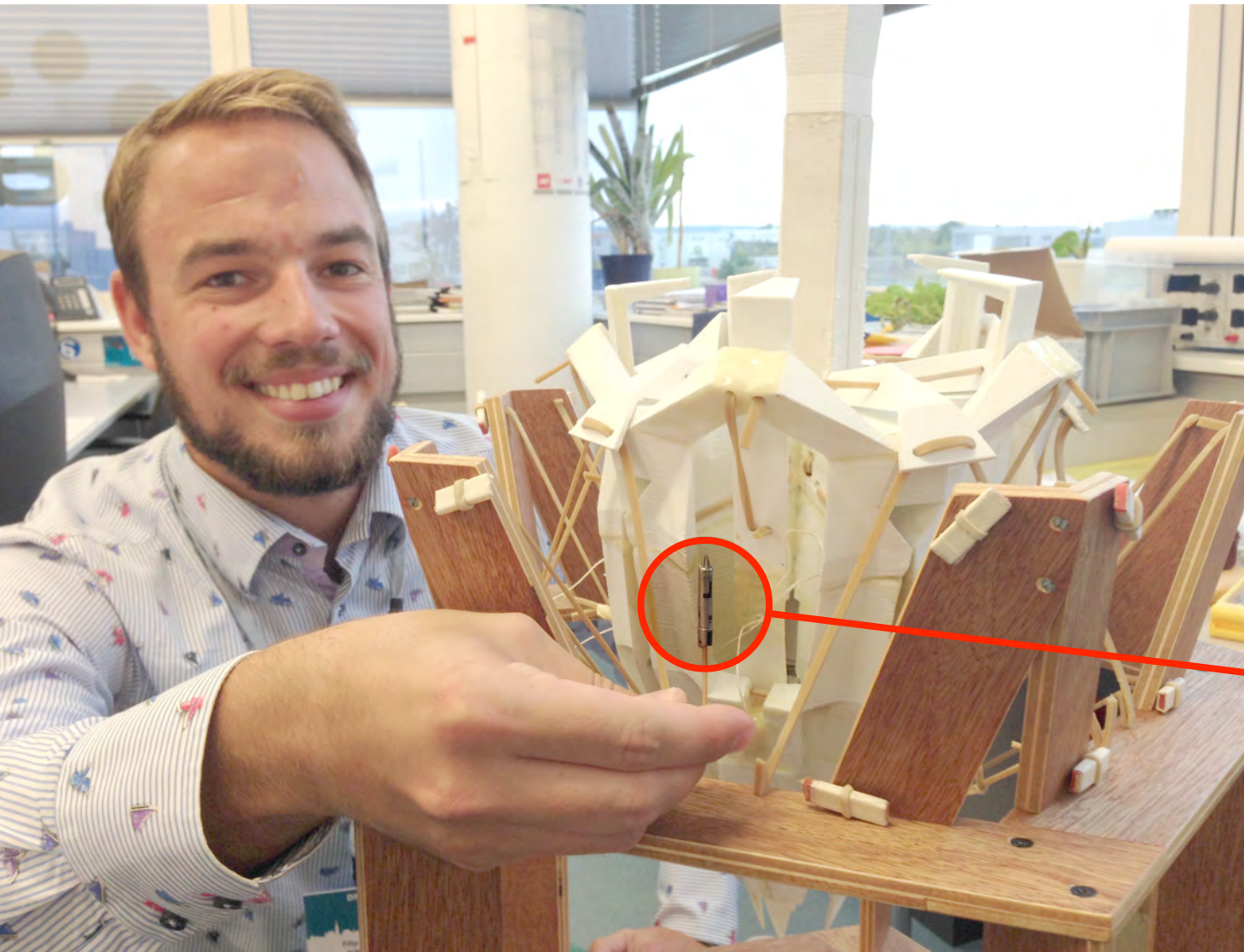
BIOPSY HARVESTER

JELÍNEK ET AL.

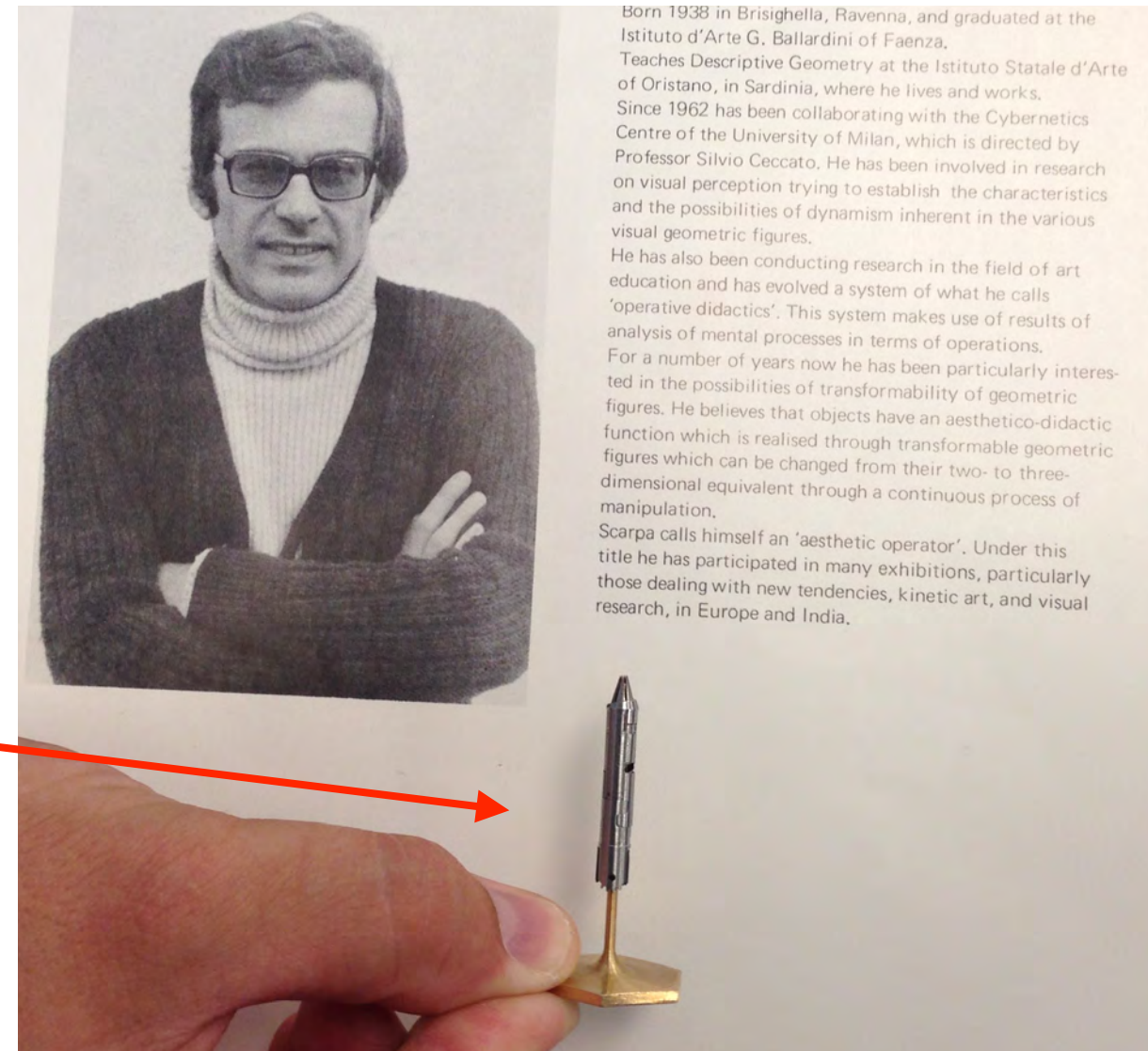
DELFT UNIVERSITY OF TECHNOLOGY
(TU DELFT)

(Jelínek, Smit, Breedveld, TU Delft; ACMIT, Austria, 2014)

Filip Jelínek

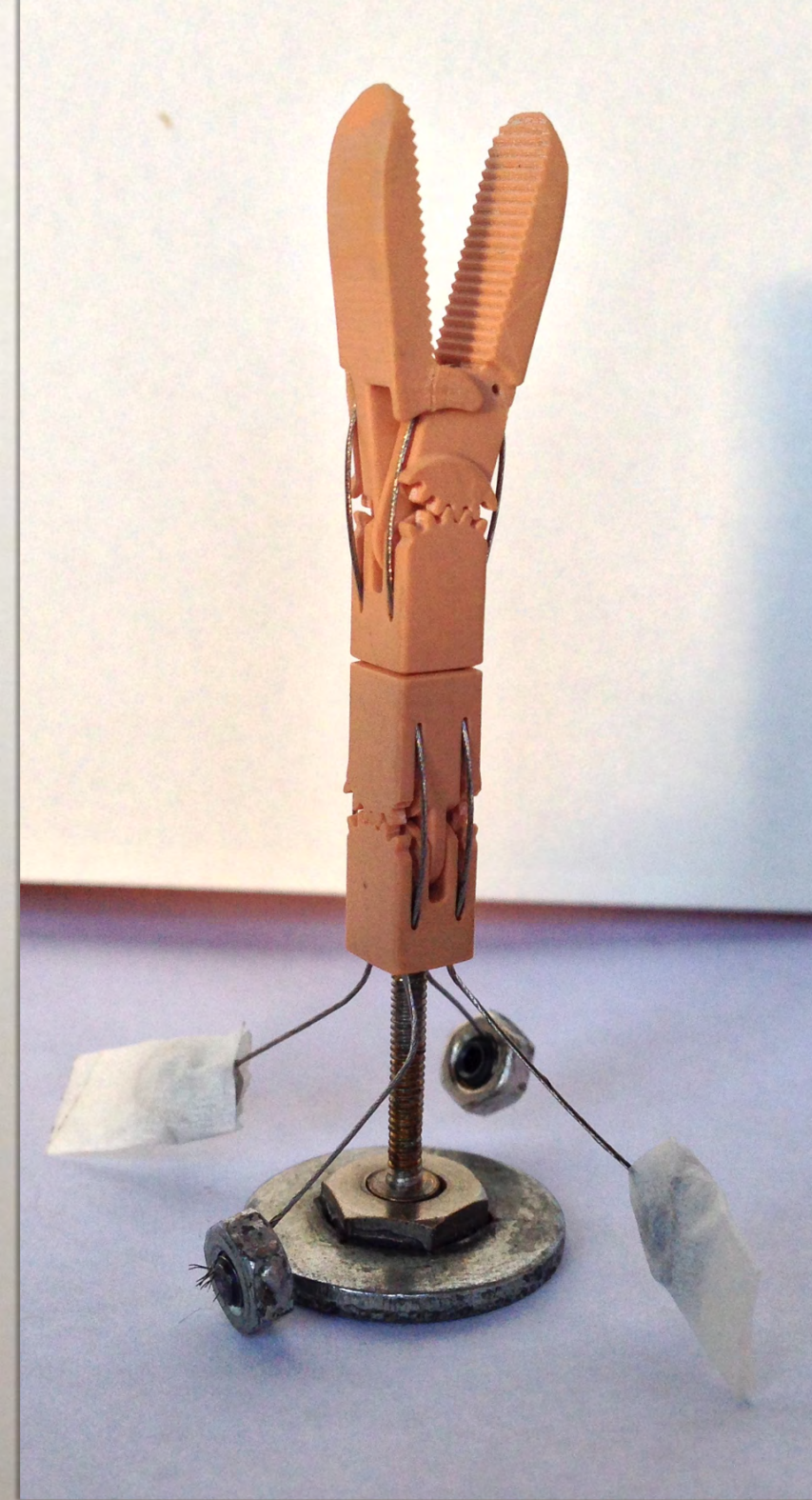
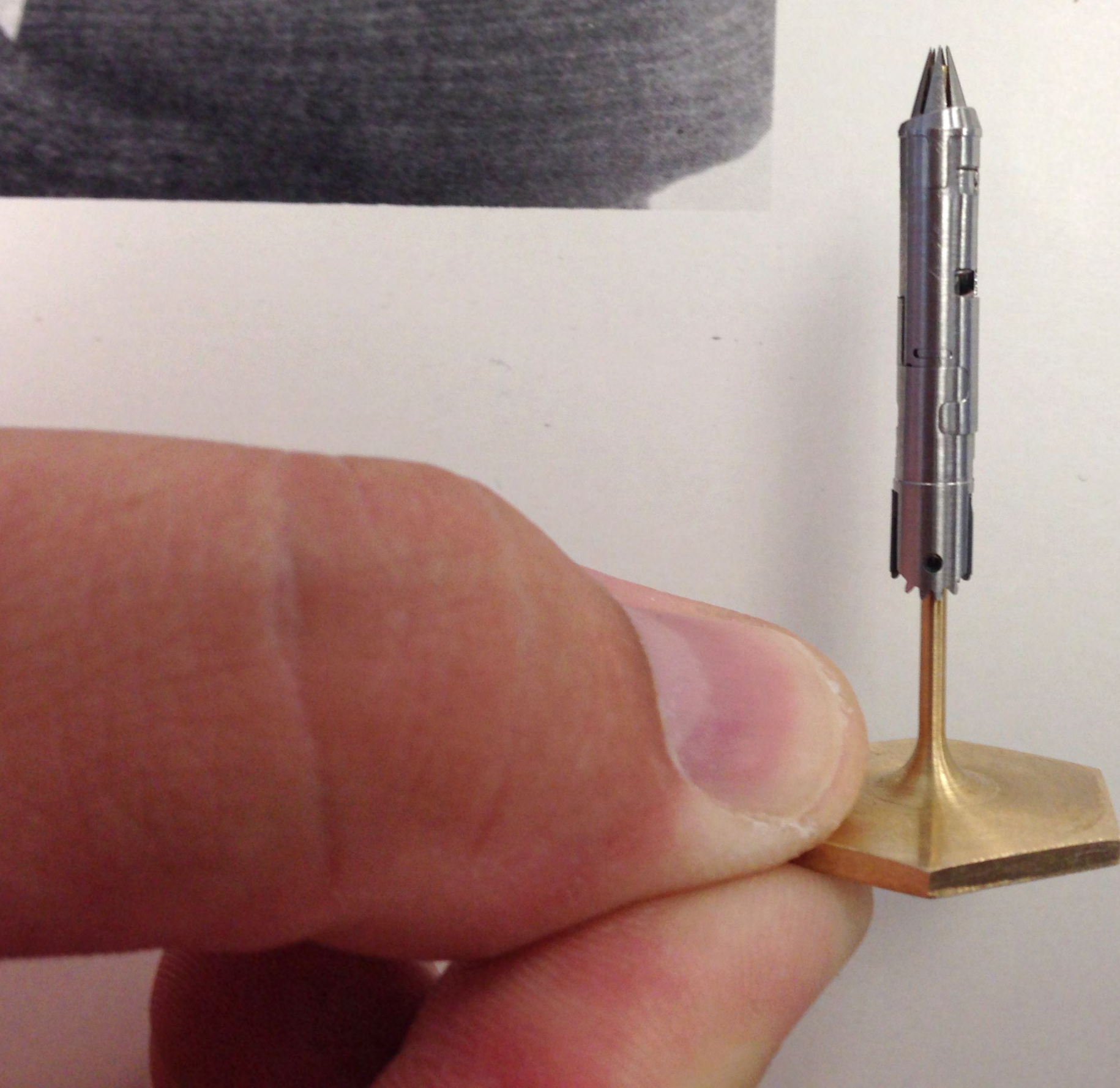


Giorgio Scarpa

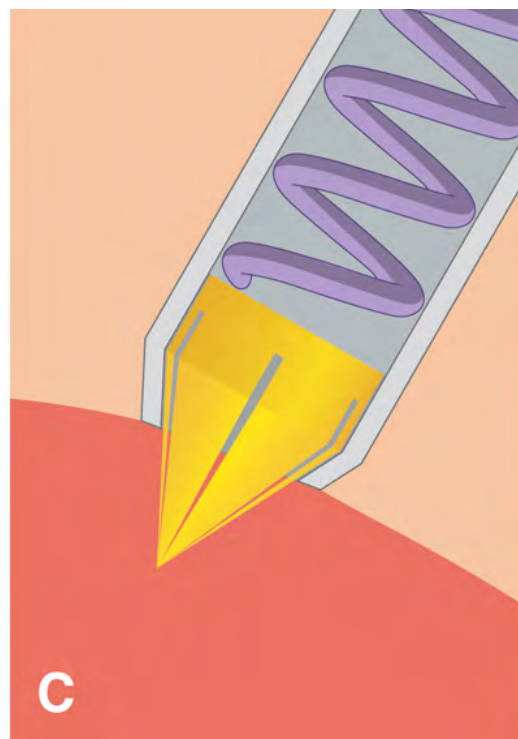
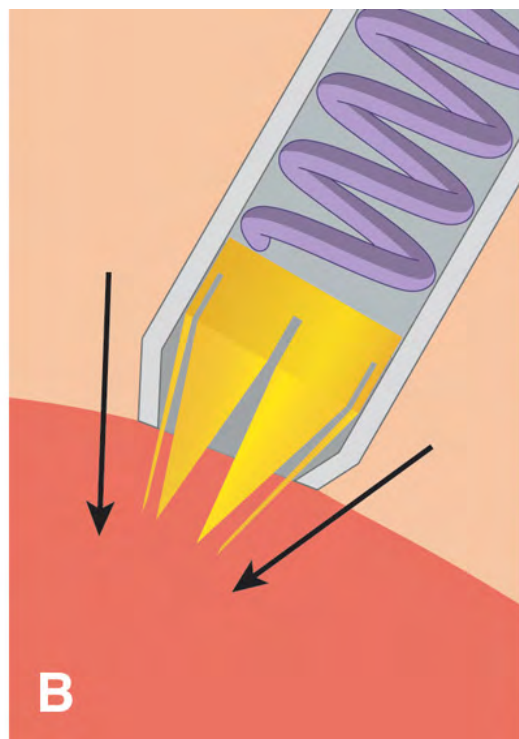
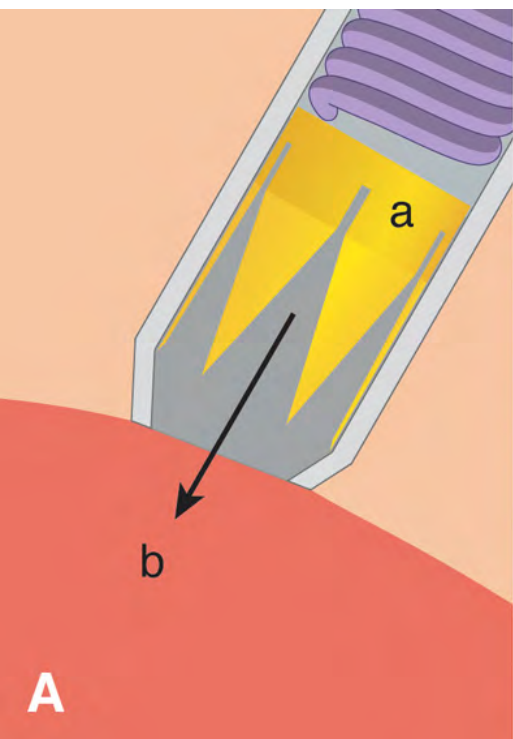


Born 1938 in Brisighella, Ravenna, and graduated at the Istituto d'Arte G. Ballardini of Faenza. Teaches Descriptive Geometry at the Istituto Statale d'Arte of Oristano, in Sardinia, where he lives and works. Since 1962 has been collaborating with the Cybernetics Centre of the University of Milan, which is directed by Professor Silvio Ceccato. He has been involved in research on visual perception trying to establish the characteristics and the possibilities of dynamism inherent in the various visual geometric figures. He has also been conducting research in the field of art education and has evolved a system of what he calls 'operative didactics'. This system makes use of results of analysis of mental processes in terms of operations. For a number of years now he has been particularly interested in the possibilities of transformability of geometric figures. He believes that objects have an aesthetico-didactic function which is realised through transformable geometric figures which can be changed from their two- to three-dimensional equivalent through a continuous process of manipulation. Scarpa calls himself an 'aesthetic operator'. Under this title he has participated in many exhibitions, particularly those dealing with new tendencies, kinetic art, and visual research, in Europe and India.

(Jelínek, Smit, Breedveld, TU Delft; ACMIT, Austria, 2014)



(Jelínek, Smit, Breedveld, TU Delft;
ACMIT, Austria, 2014)



(Jelínek, Smit, Breedveld, TU Delft;
ACMIT, Austria, 2014)

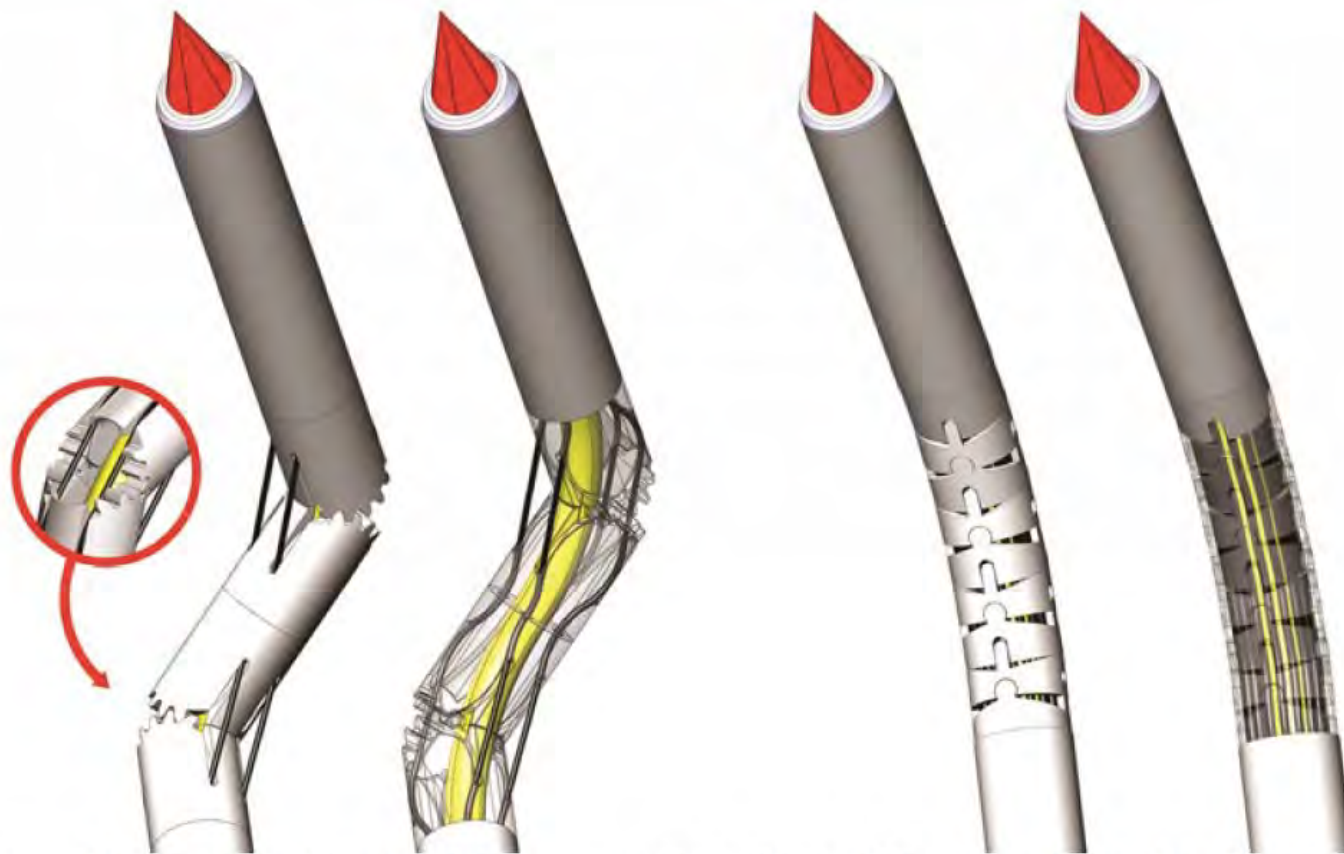
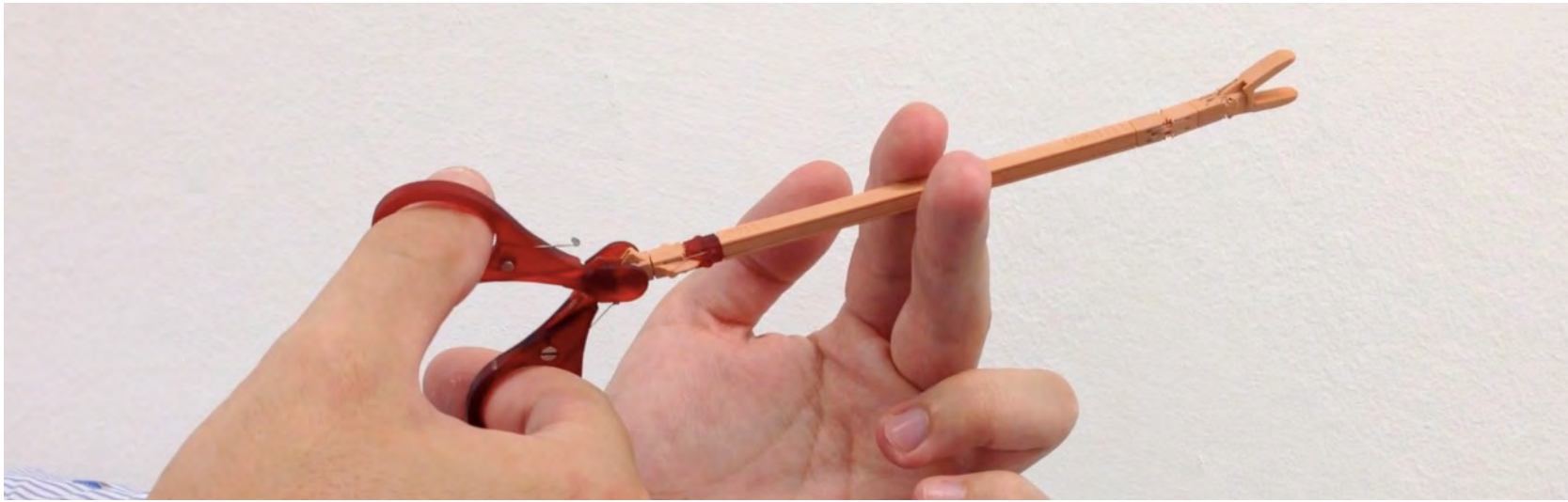


Figure 9.3 Feasible steerable joint constructions: the additive manufactured rolling joint construction and the laser cut joint construction. Joints are actuated by steering cables (black).

Jelínek, Filip, Steering and Harvesting Technology for Minimally Invasive Biopsy

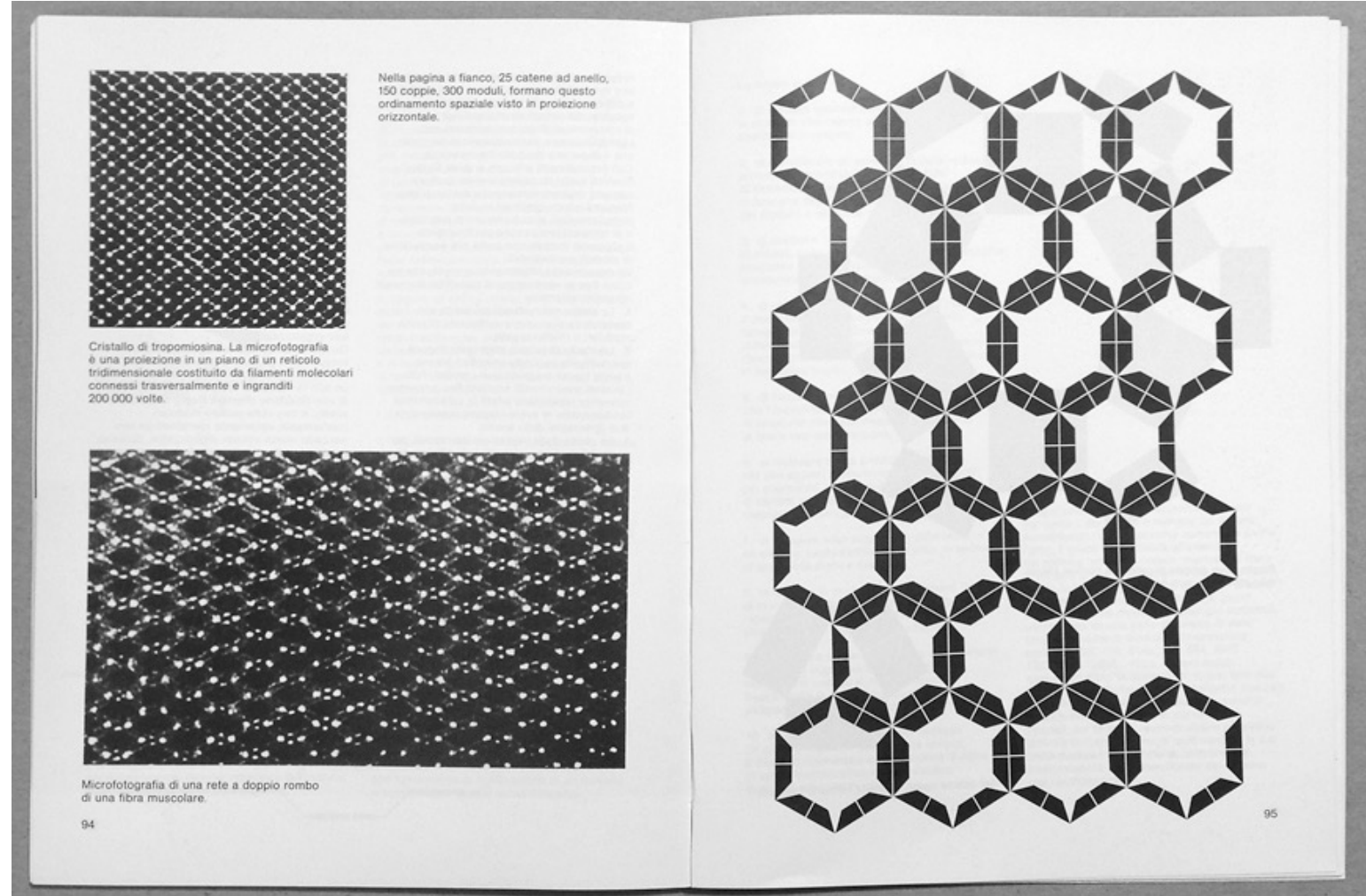
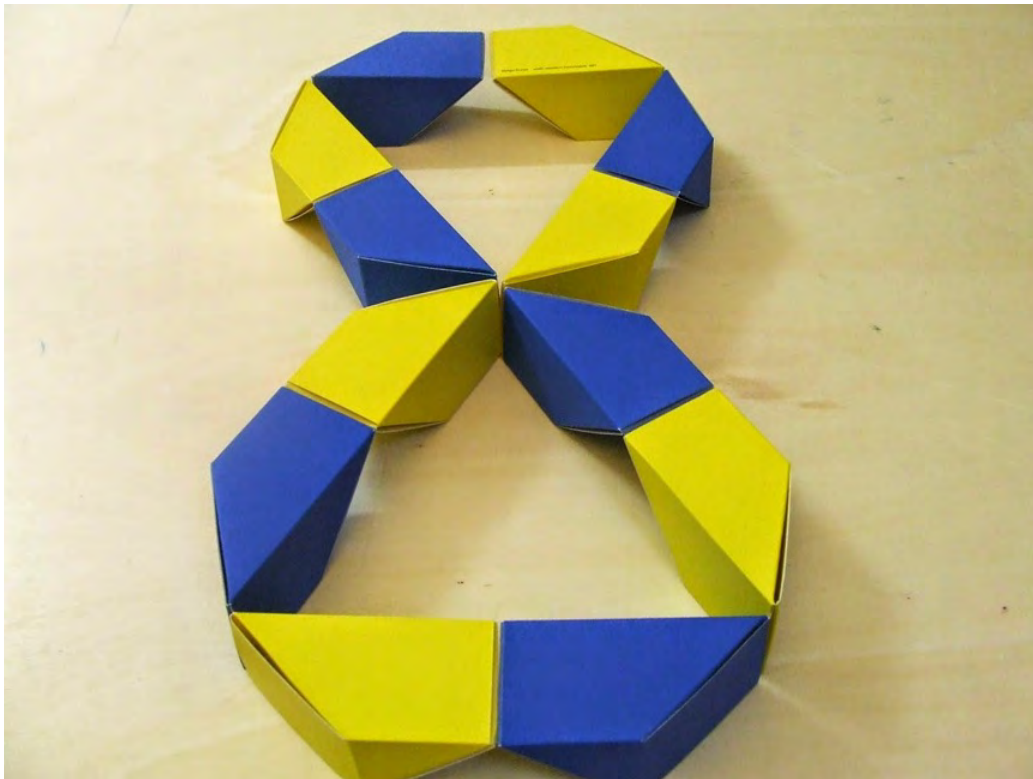
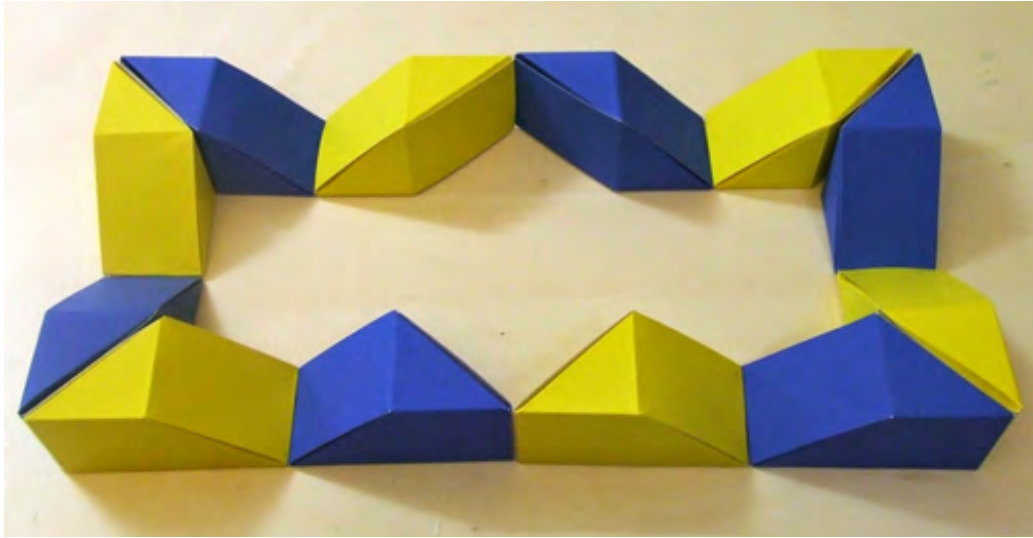
PhD dissertation

doi:10.4233/uuid:18bc7cc6-153b-4ffe-8da1-474f08a212fc

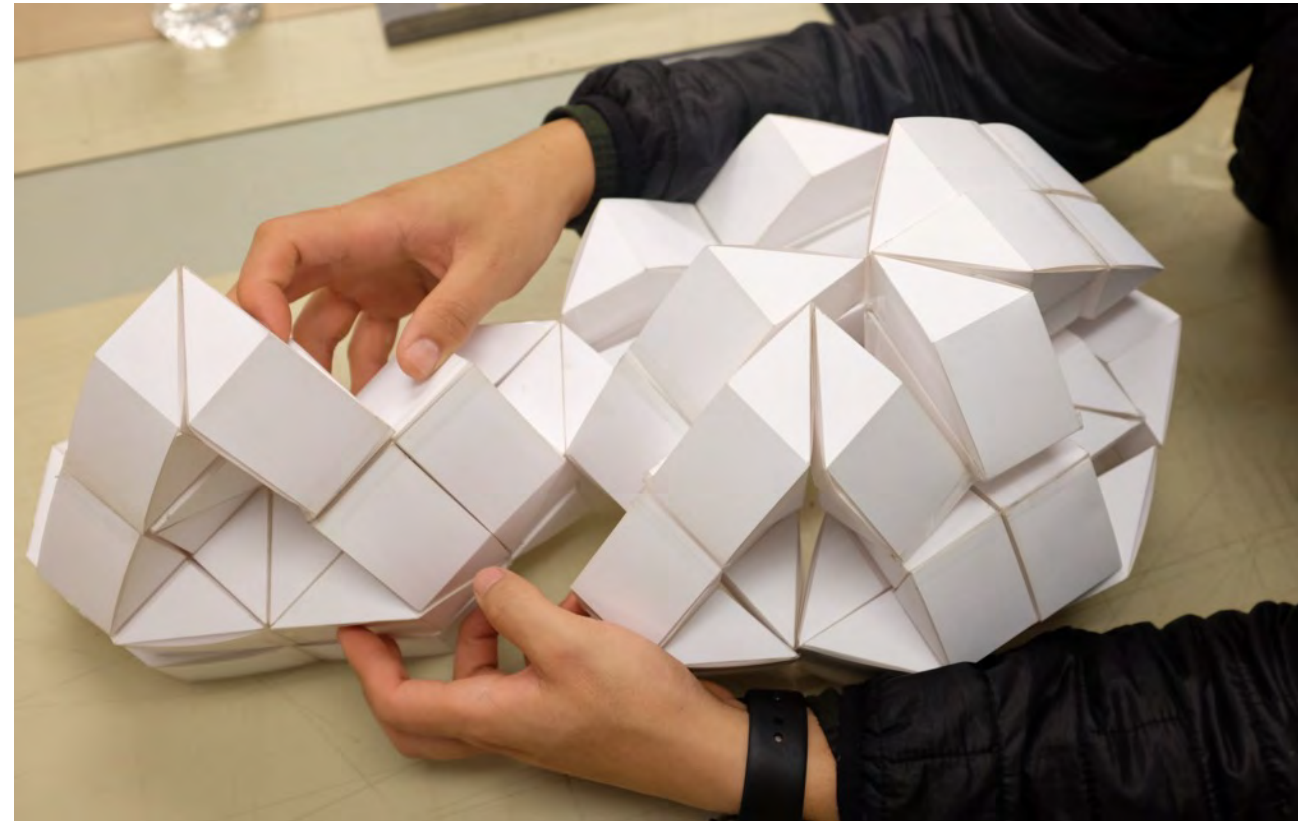
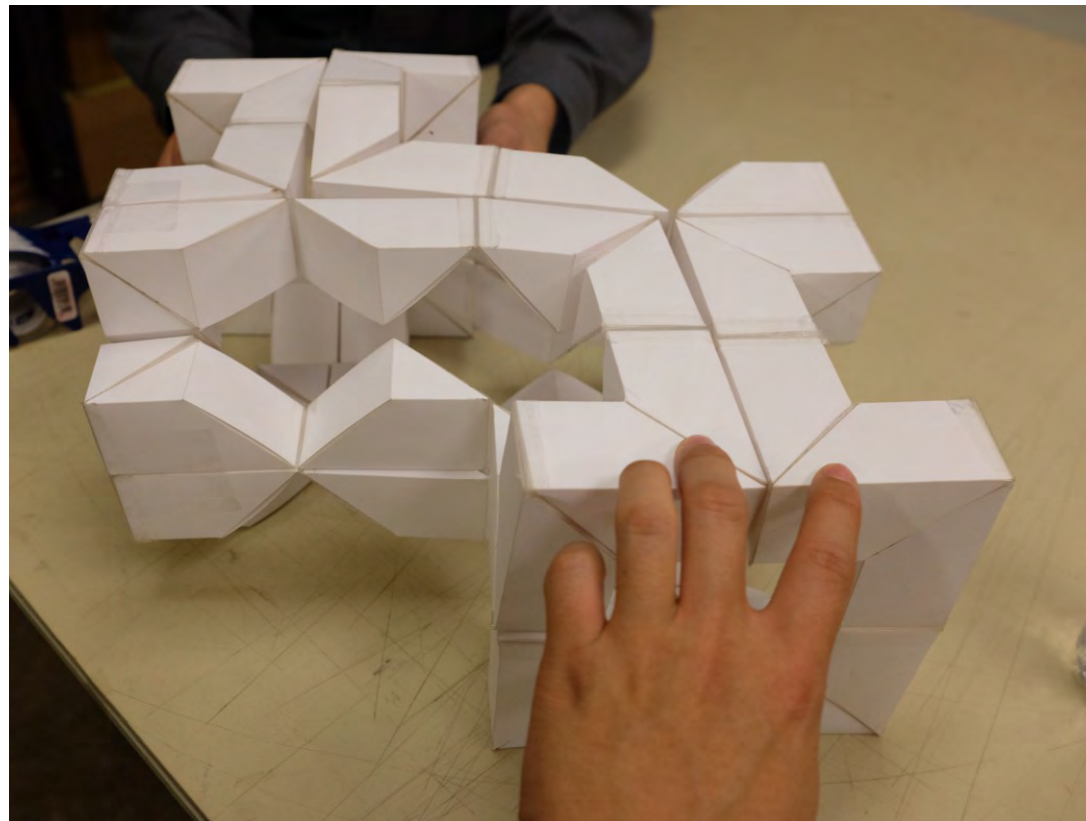
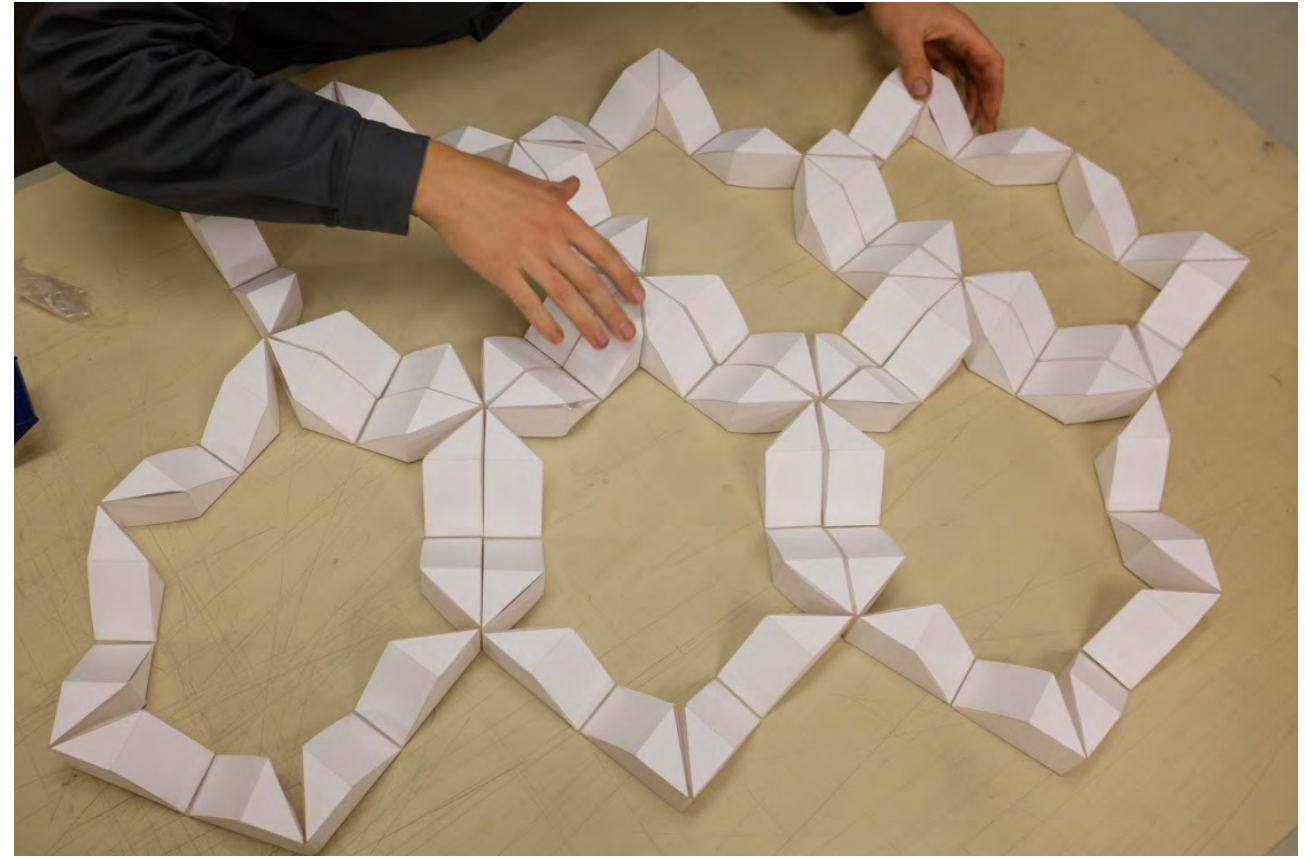
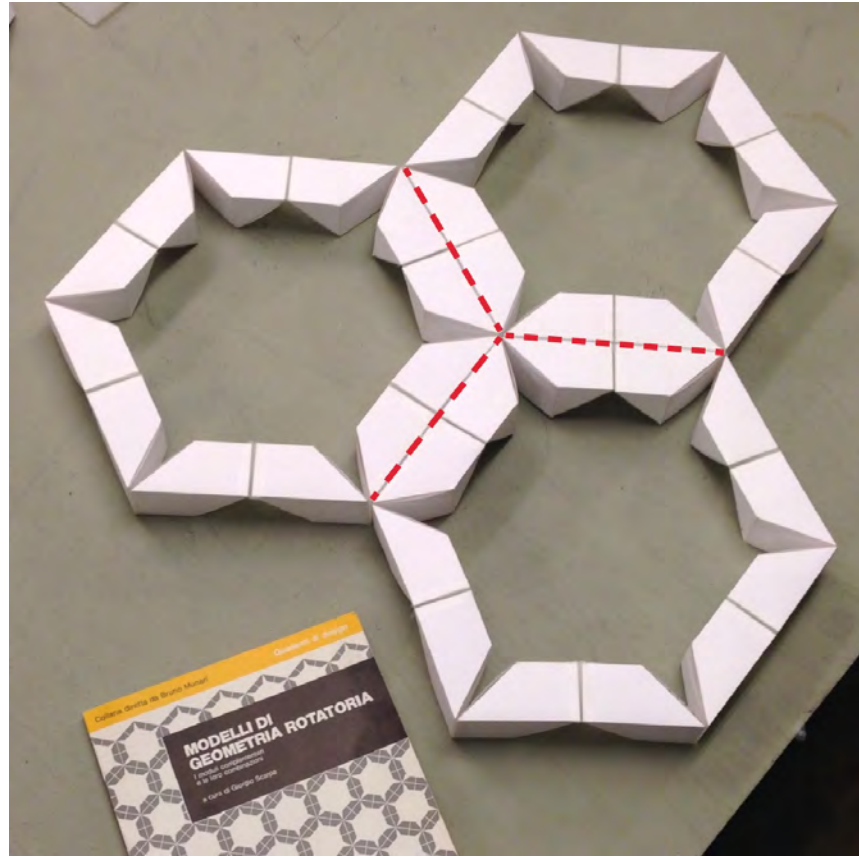
Delft University of Technology, 2015

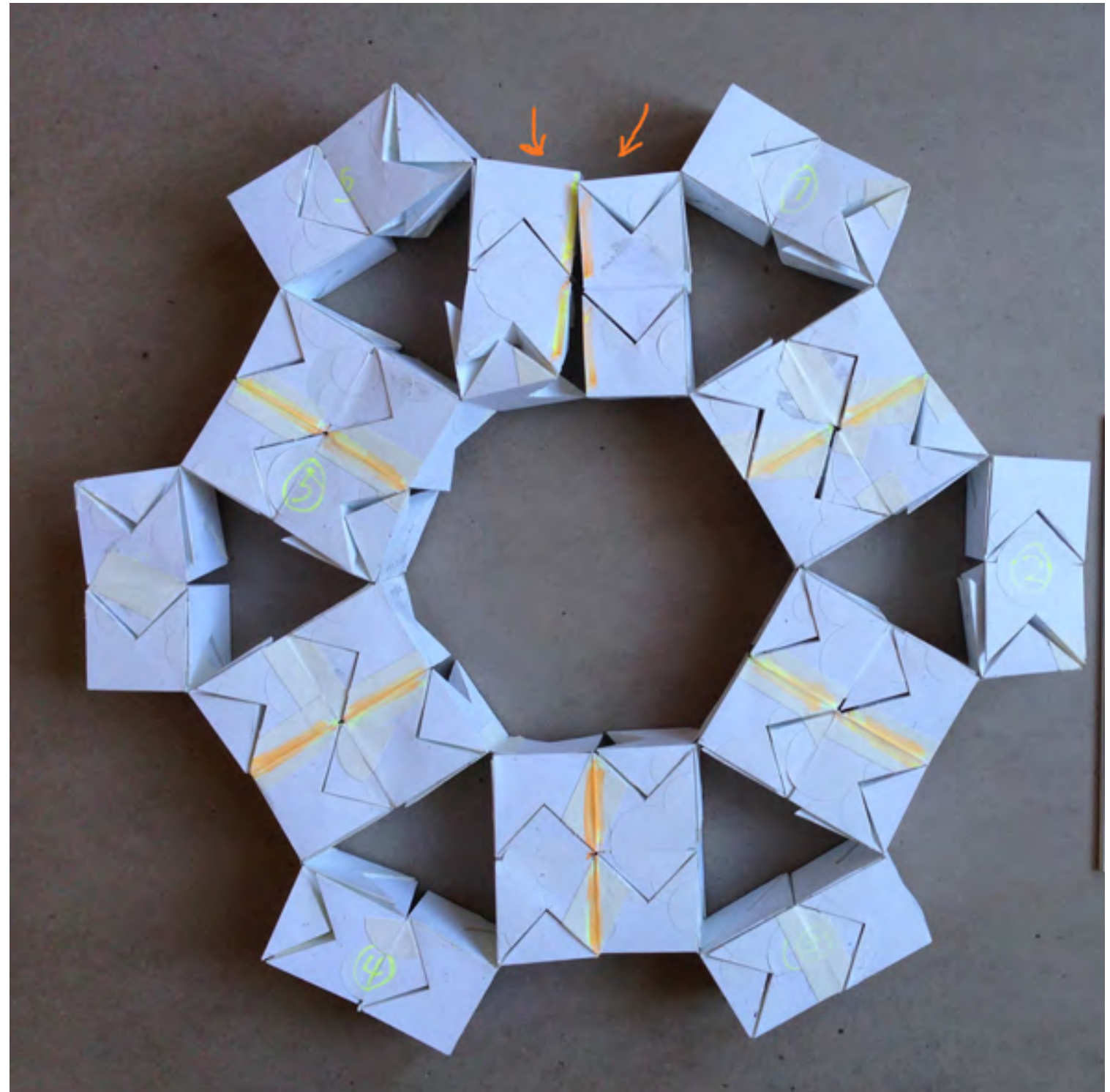
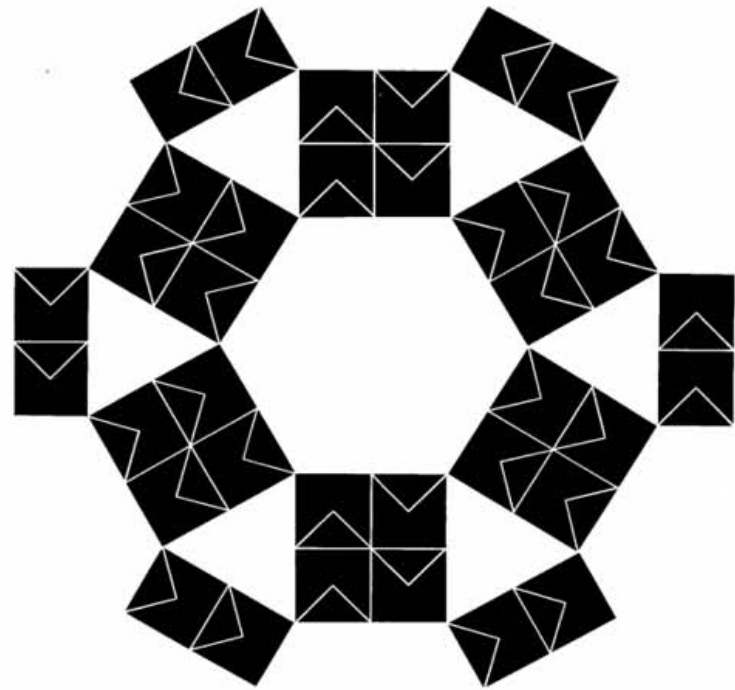
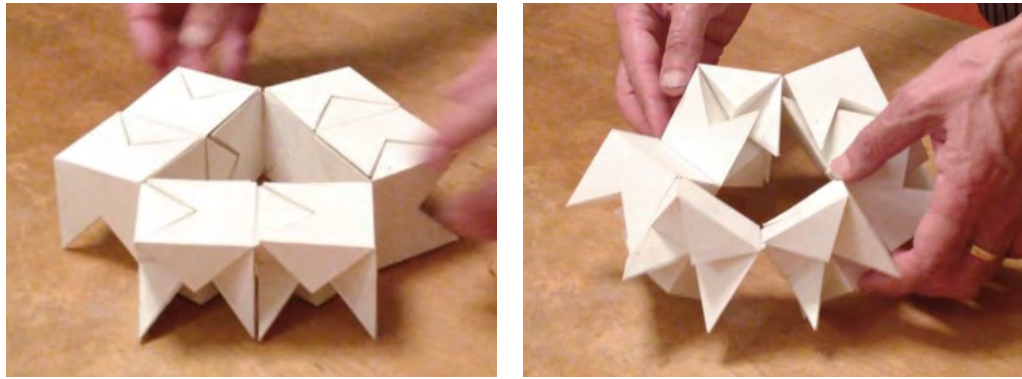
[Jelínek, Filip, Steering and Harvesting Technology for Minimally Invasive Biopsy](#)

PERIODIC STRUCTURES



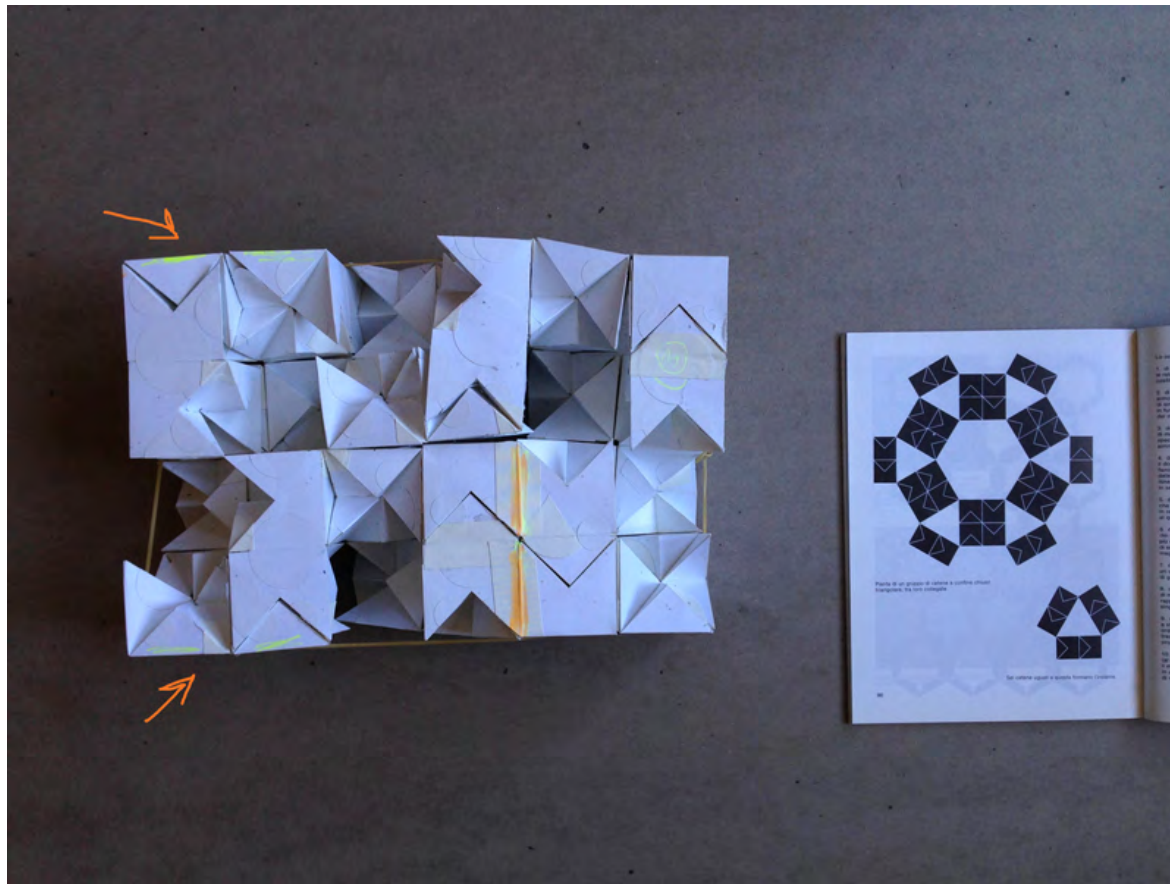
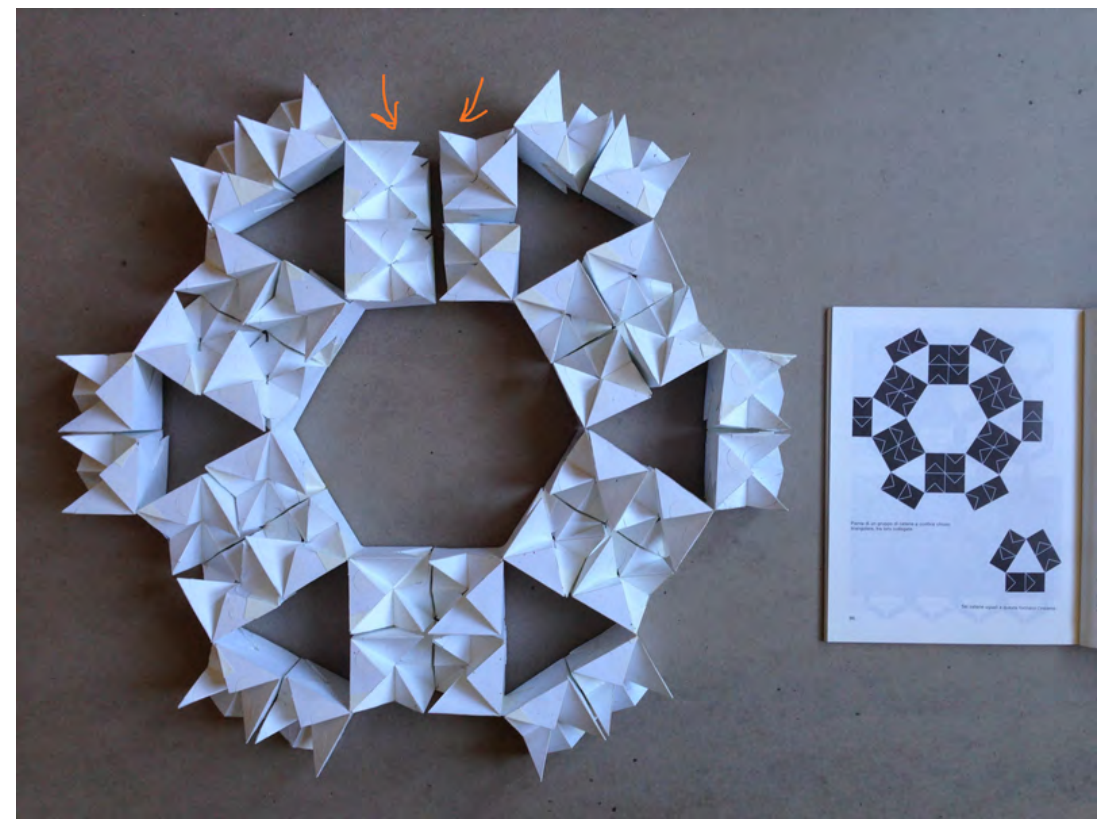
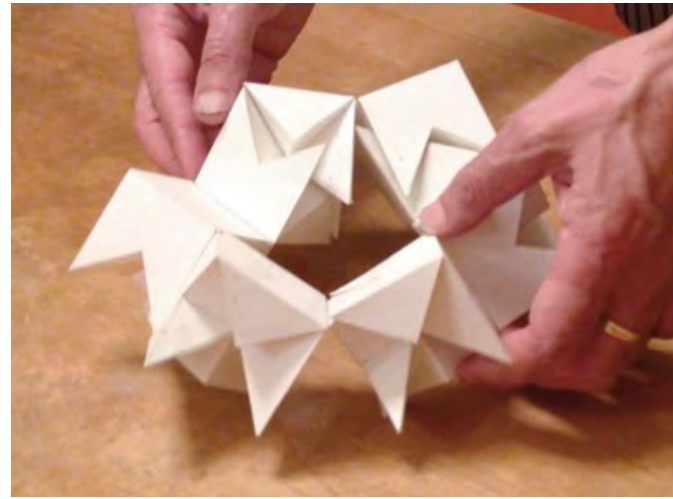
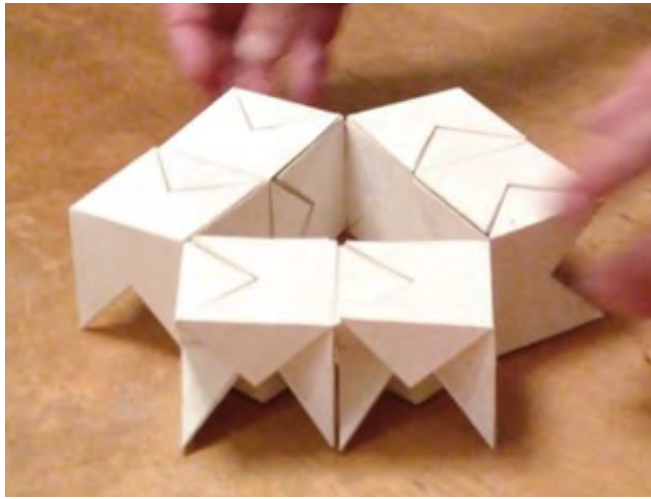
PROTOTYPE OF TRANSFORMABLE CHAIN BY GIORGIO SCARPA.
MODEL CONSTRUCTION: LAMAR PI & JACK LIONS, SAN FRANCISCO STATE UNIVERSITY





(Trogu & Nies, prototype, 2015)

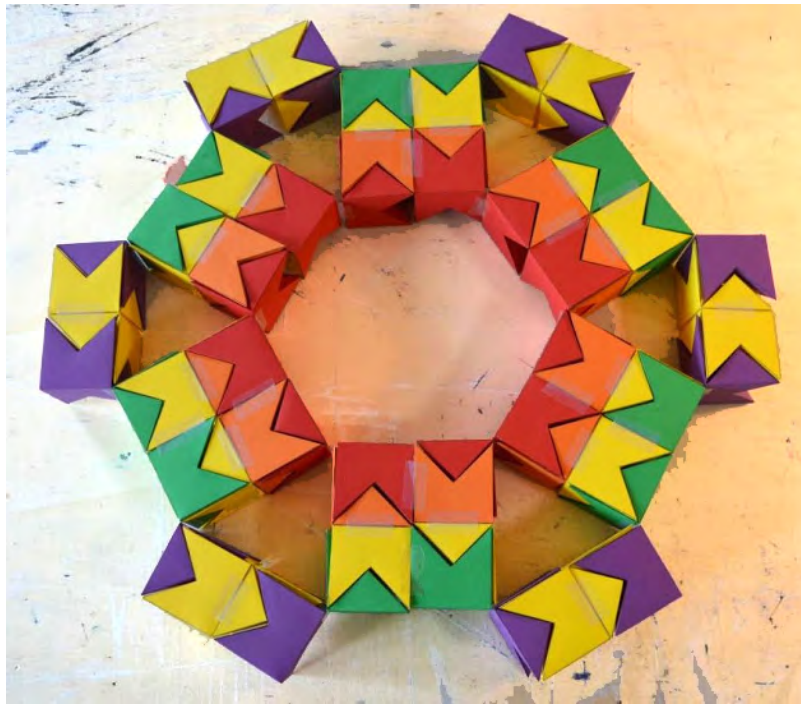
**PROTOTYPE OF TRANSFORMABLE CHAIN BY GIORGIO SCARPA.
MODEL CONSTRUCTION BY PINO TROGU & CLIFF NIES**



Scarpa, *Models of Rotational Geometry*, pp. 66-68, 96

(Trogu & Nies, prototype, 2015)

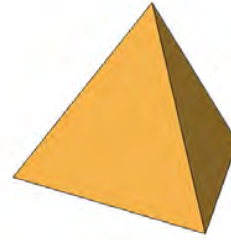




**PROTOTYPE OF TRANSFORMABLE CHAIN BY GIORGIO SCARPA.
MODEL CONSTRUCTION BY FEDERICA DESTRI, OFFANENGO (ITALY)**

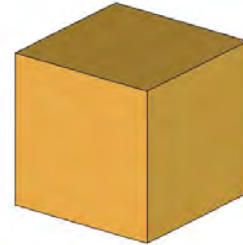
PLATONIC SOLIDS (REGULAR POLYHEDRA)

TETRAHEDRON



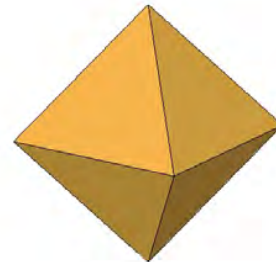
4 TRIANGLES

HEXAHEDRON (CUBE)



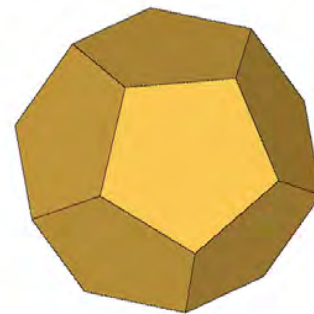
6 SQUARES

OCTAHEDRON



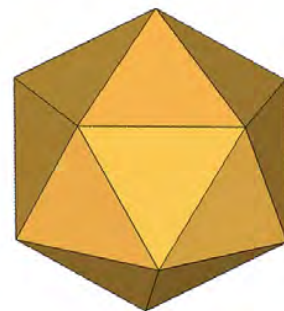
8 TRIANGLES

DODECAHEDRON



12 PENTAGONS

ICOSAHEDRON



20 TRIANGLES

THE THREE REGULAR HONEYCOMBS

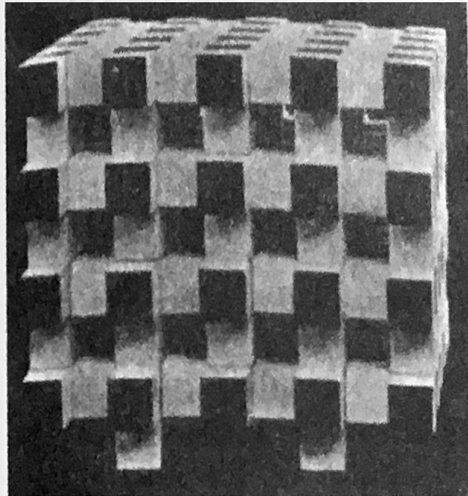


Fig. i: $\{4, 6|4\}$.

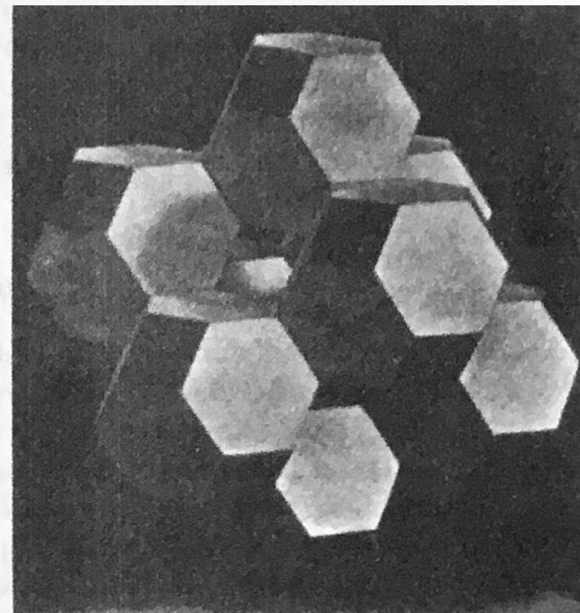


Fig. ii: $\{6, 4|4\}$.

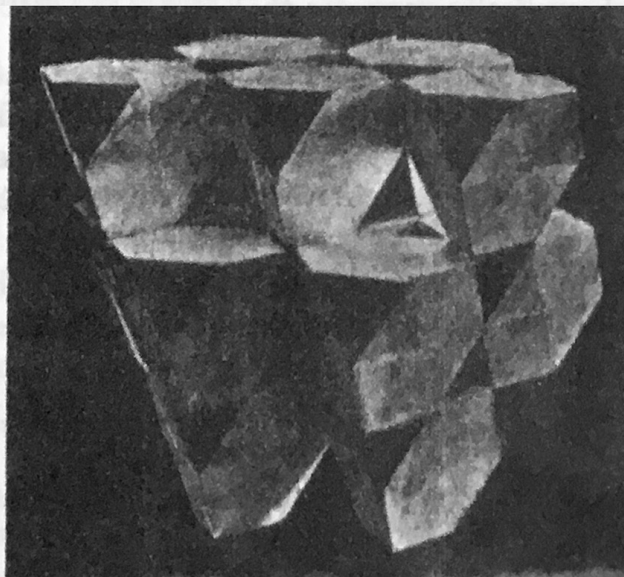
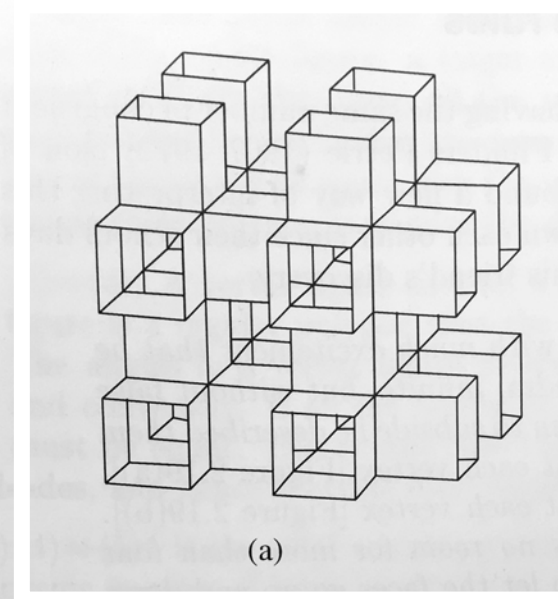
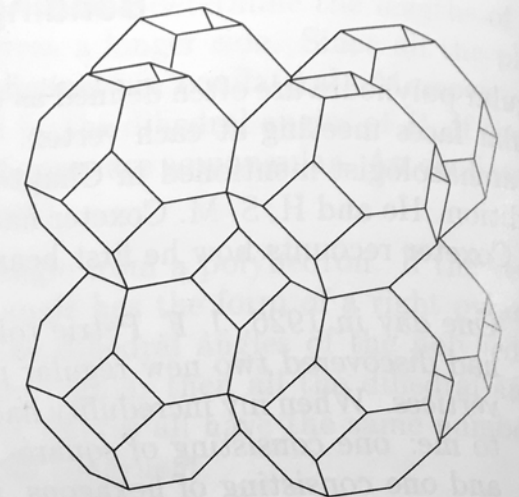


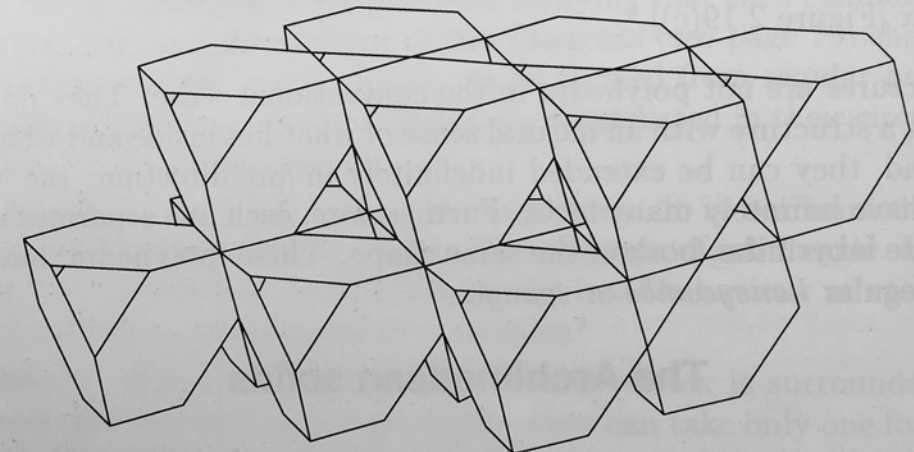
Fig. iii: $\{6, 6|3\}$.



(a)



(b)

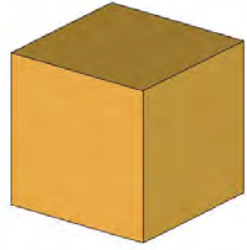


(c)

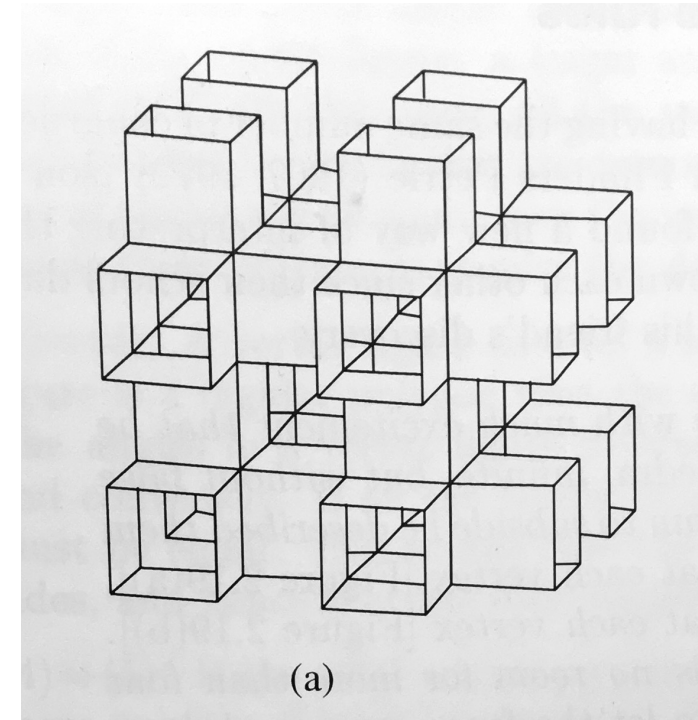
Figure 2.19. The three regular honeycombs.

J. F. PETRIE & H.S.M. COXETER, 1926

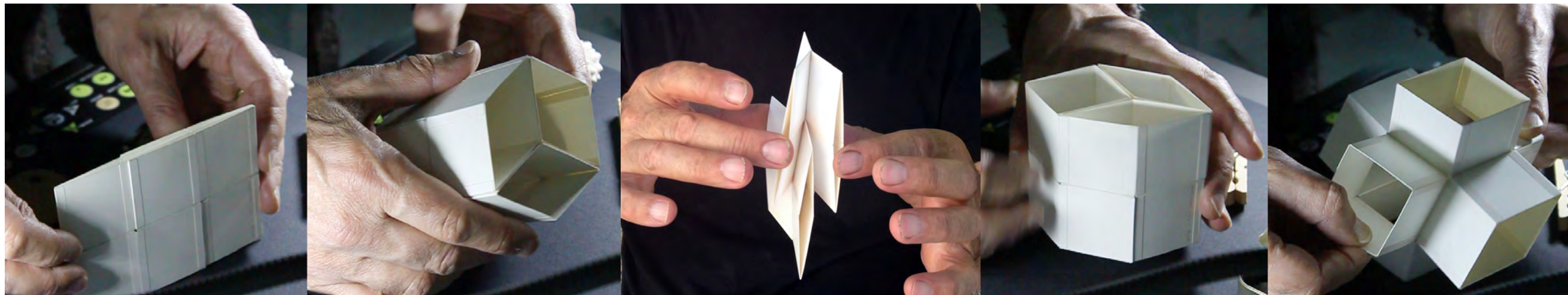
P. CROMWELL, 1997



J. F. PETRIE, 1926



G. SCARPA, 1996

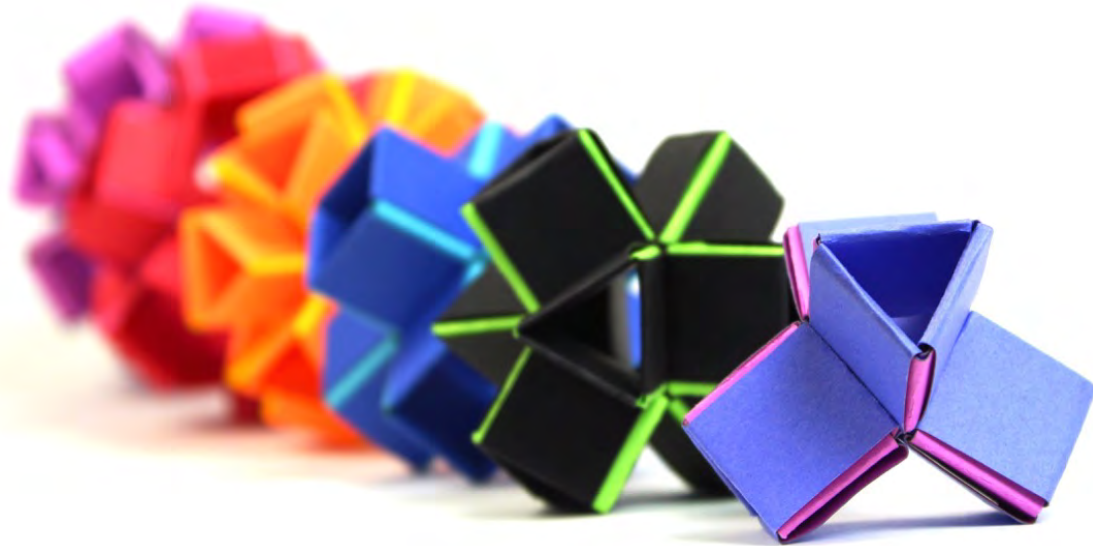


B. OVERVELDE, 2016



“METAMATERIALS”, B. OVERVELDE, 2016

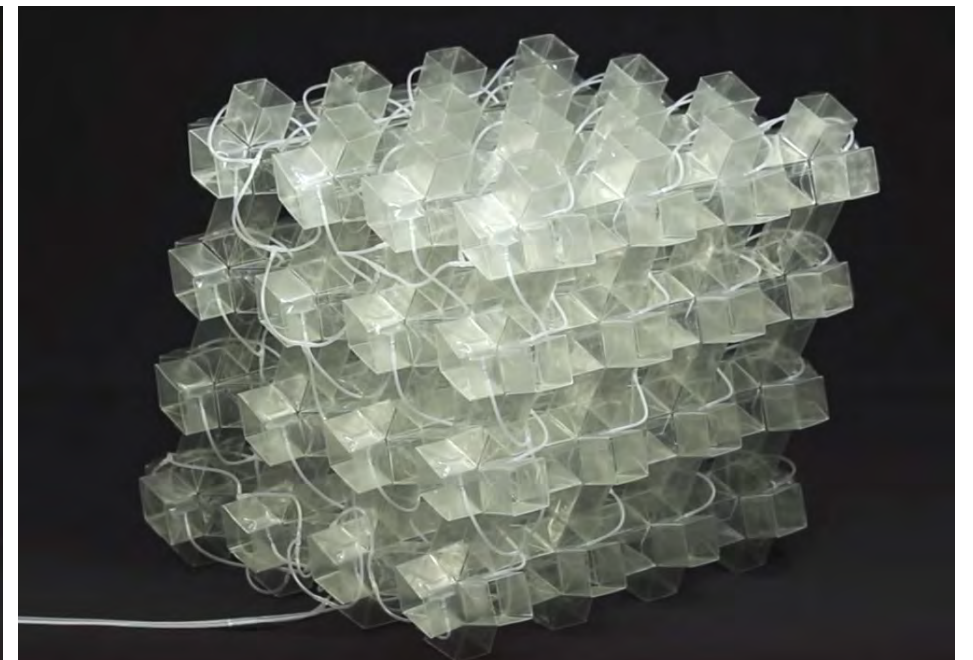
SNAP ORIGAMI POLYHEDRA



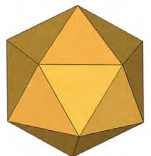
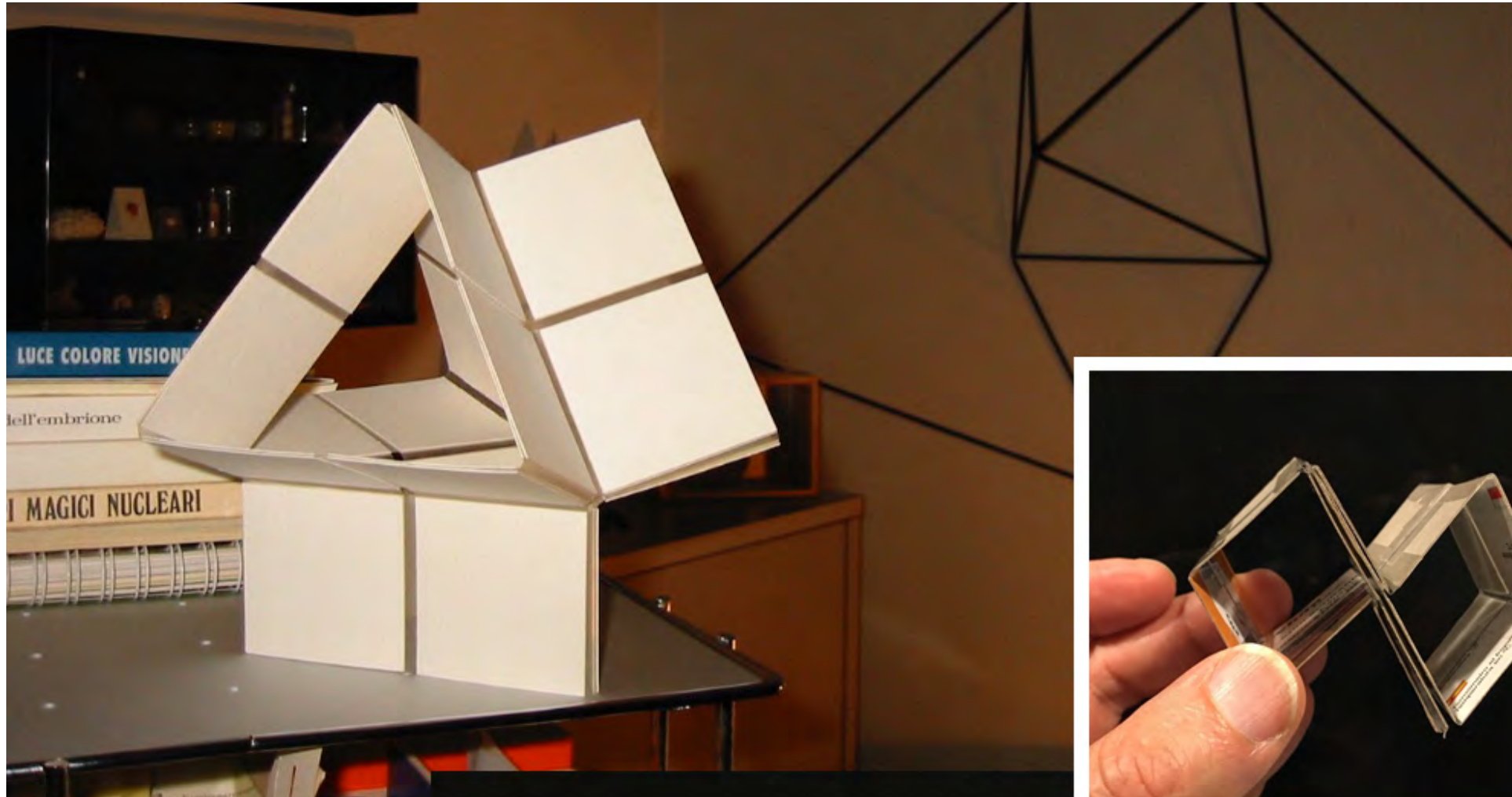
ICOSAHEDRON: RIGID



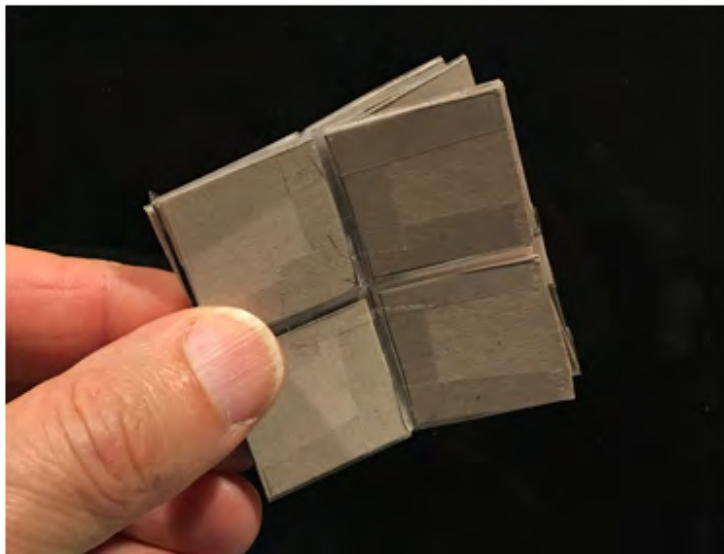
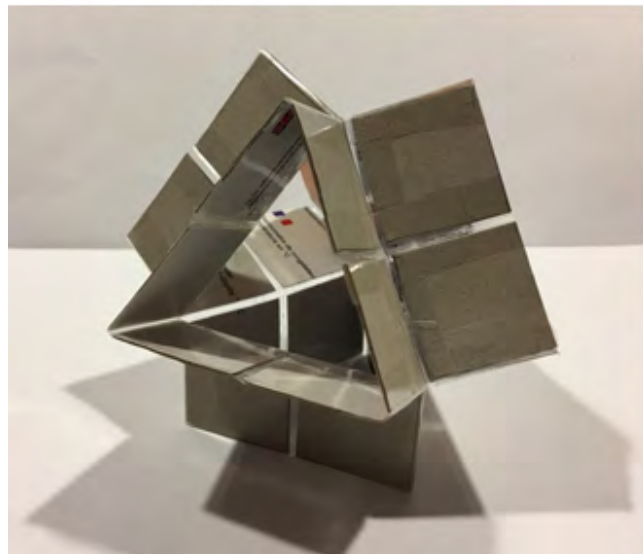
CUBE: FLEXIBLE



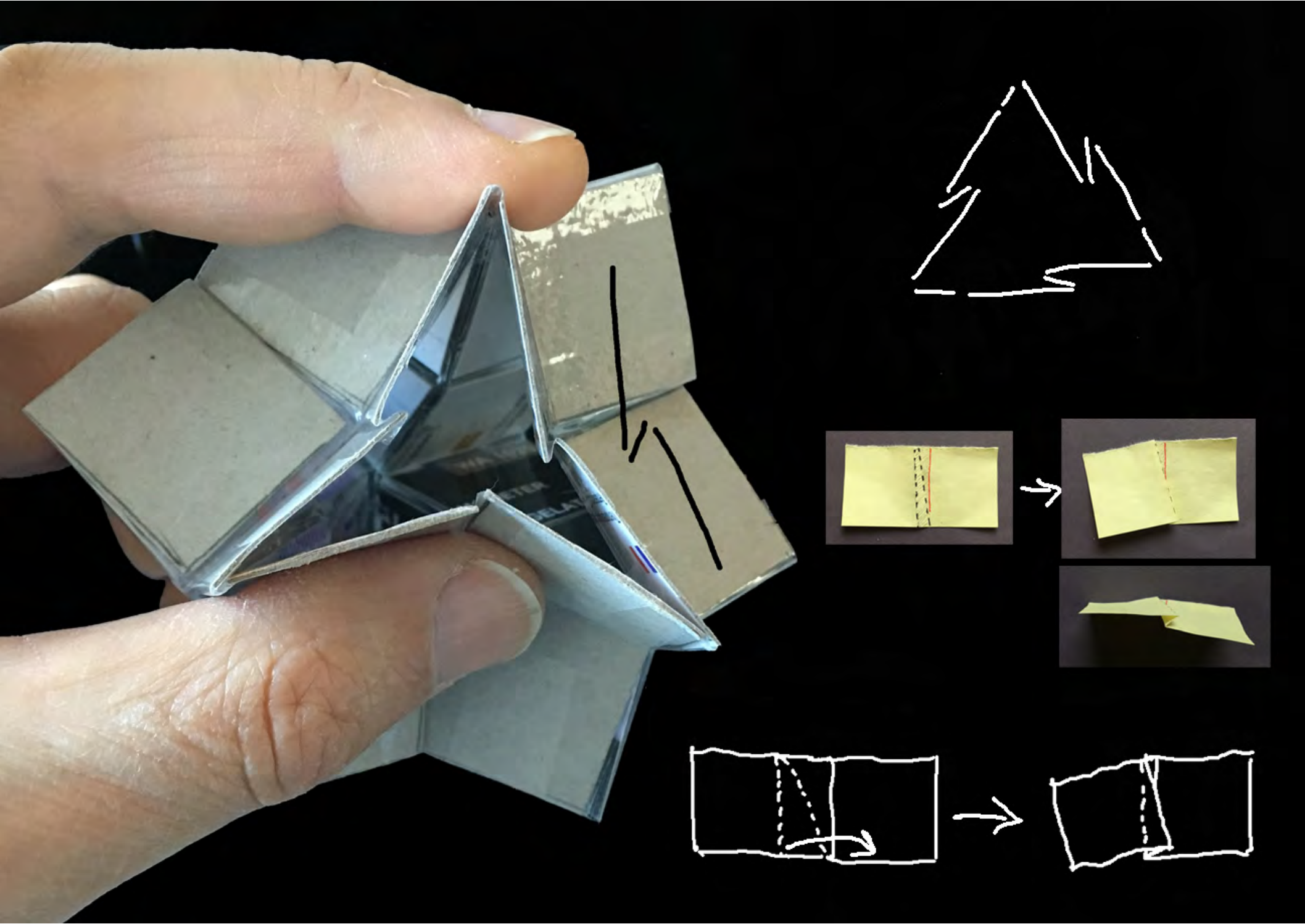
SPLIT EXTRUSION TETRAHEDRON BY G. SCARPA



SPLIT EXTRUSION
TETRAHEDRON
(REPLICA)
PINO TROGU, 2017



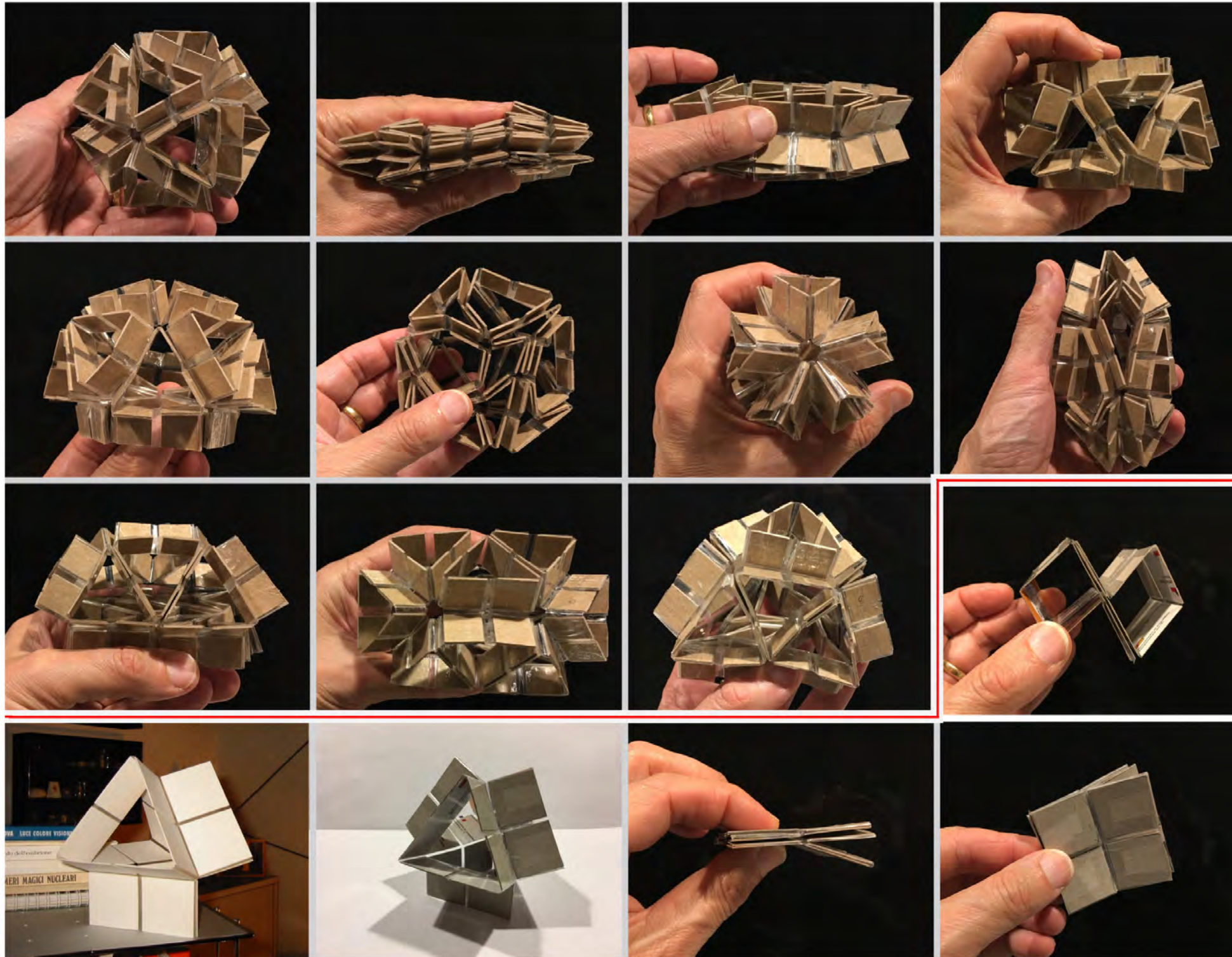
SPLIT EXTRUSION TETRAHEDRON BY G. SCARPA



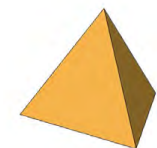
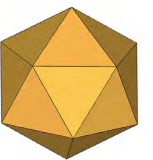
SPLIT EXTRUSION
TETRAHEDRON
(REPLICA)
PINO TROGU, 2017

Segmented extrusion snap origami icosahedron constructed by P. Trogu.
Based on G. Scarpa's tetrahedron. Delft, NL, October 2017.

FLEXIBLE ICOSAHEDRON, 2017



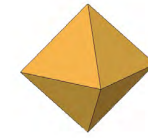
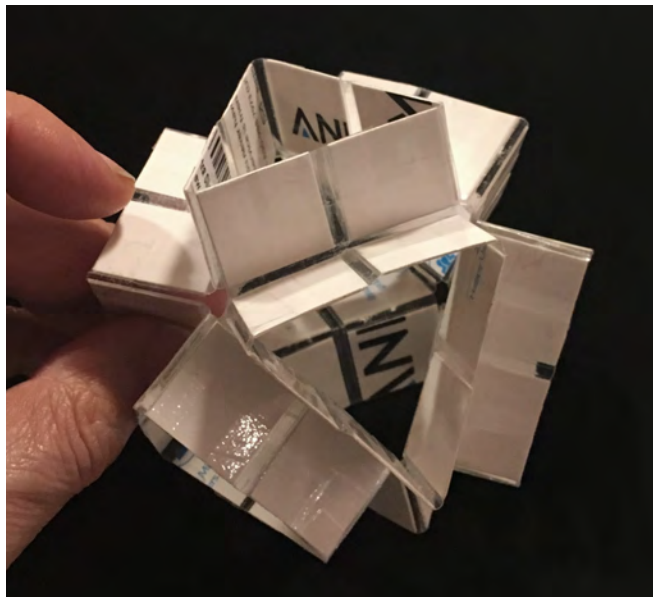
SPLIT EXTRUSION
ICOSAHEDRON –
FLEXIBLE
TROGU, 2017



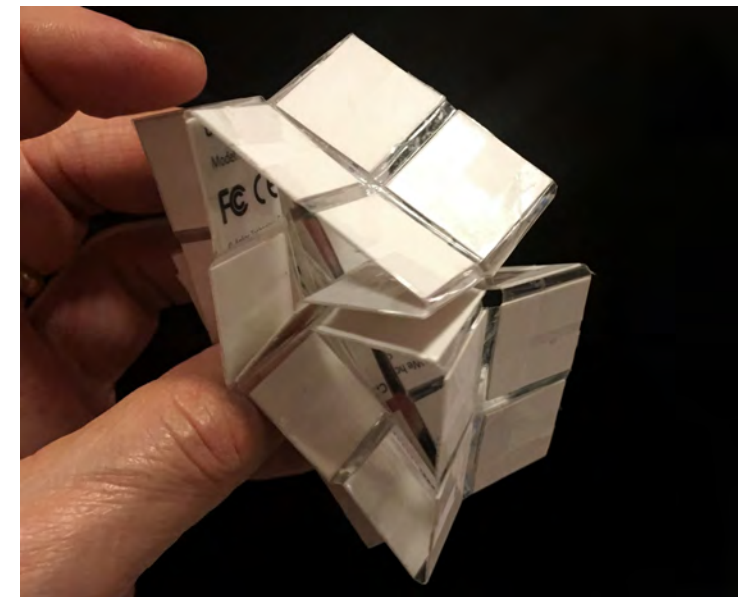
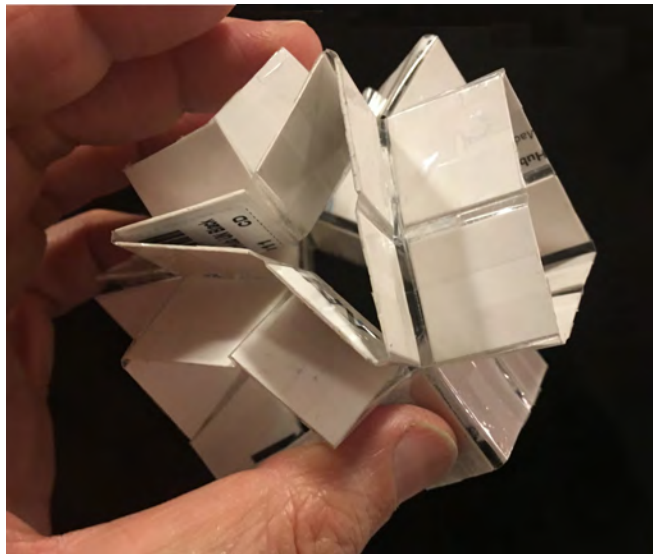
Segmented extrusion snap origami tetrahedron by
Giorgio Scarpa. Circa 1996.

Original white model (left) photographed in Castel
Bolognese, 2002. Small chip board model constructed
by P. Trogu. Delft, NL, October 2017.

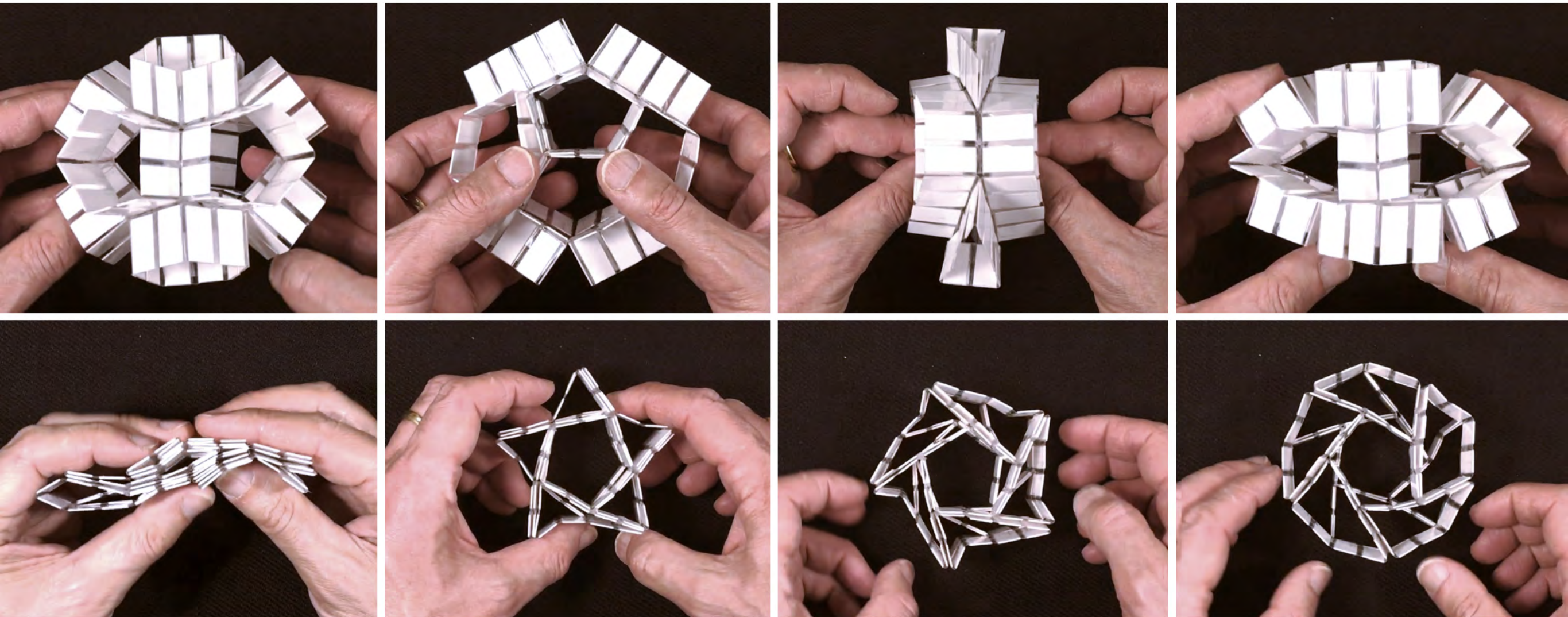
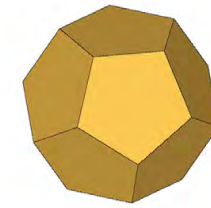
FLEXIBLE OCTAHEDRON



FLEXIBLE OCTAHEDRON
TROGU, 2017



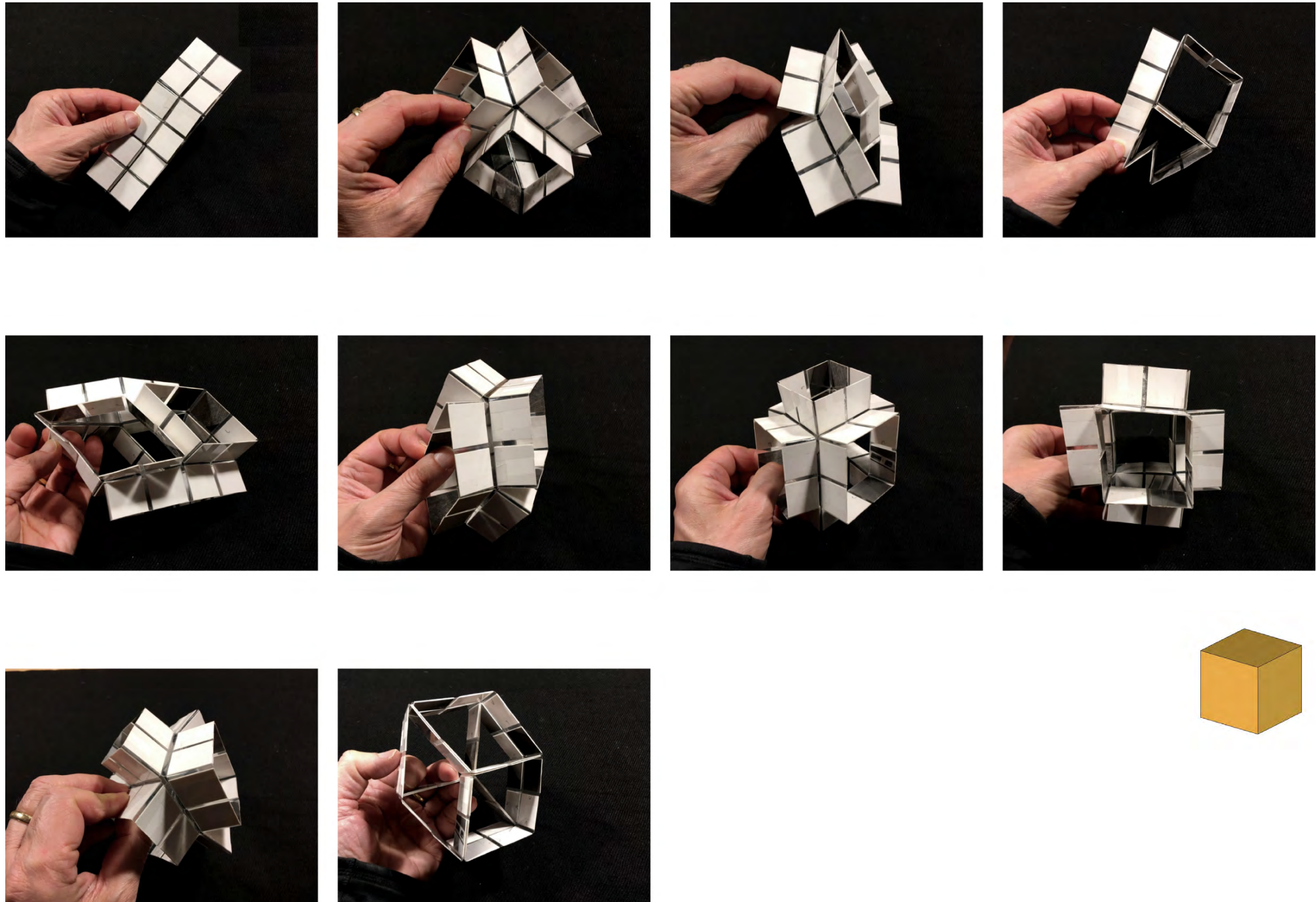
SPLIT EXTRUSION DODECAHEDRON – FLEXIBLE



SPLIT EXTRUSION DODECAHEDRON
TROGU, 2017

120 RECTANGLES OF RATIO 2:1

SPLIT EXTRUSION CUBE (HEXAHEDRON)



SPLIT EXTRUSION CUBE
TROGU, 2017

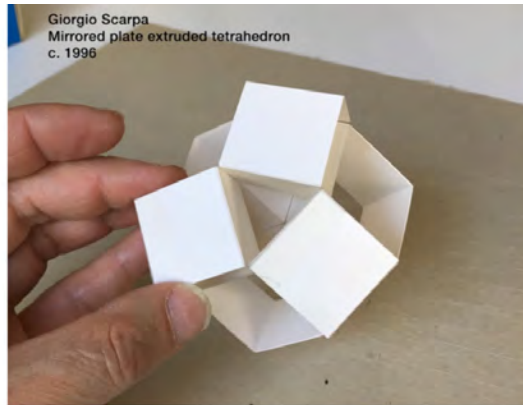
48 SQUARES

MIRRORED PLATE SPLIT EXTRUSION TETRAHEDRON



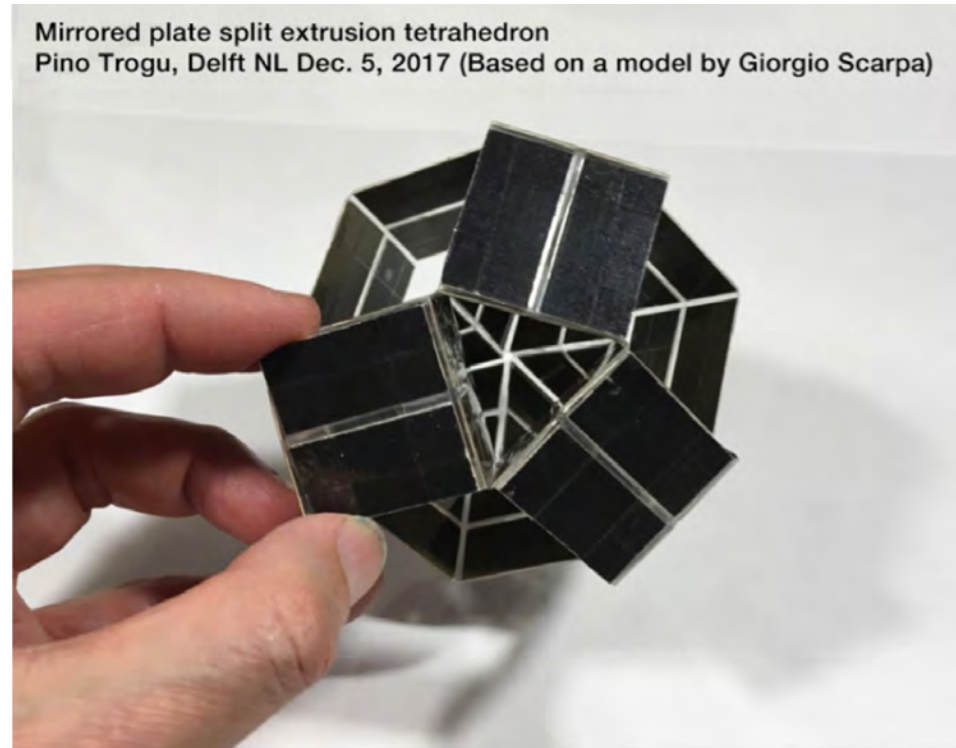
Giorgio Scarpa
Split extrusion tetrahedron
c. 1996

24 SQUARES

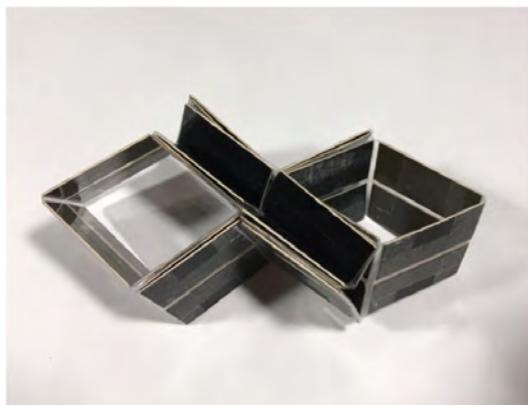
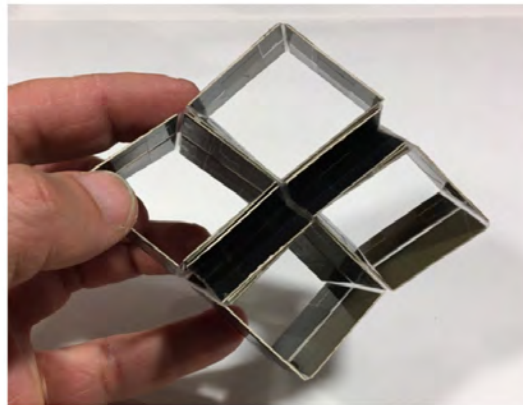
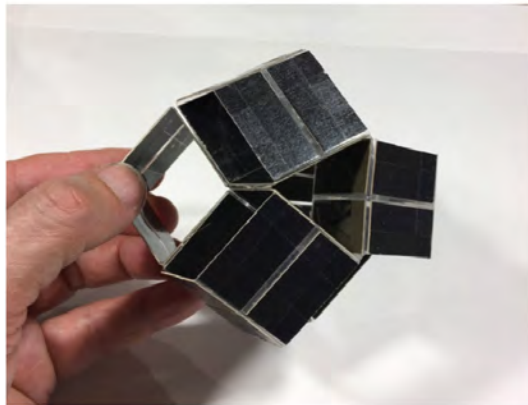


Giorgio Scarpa
Mirrored plate extruded tetrahedron
c. 1996

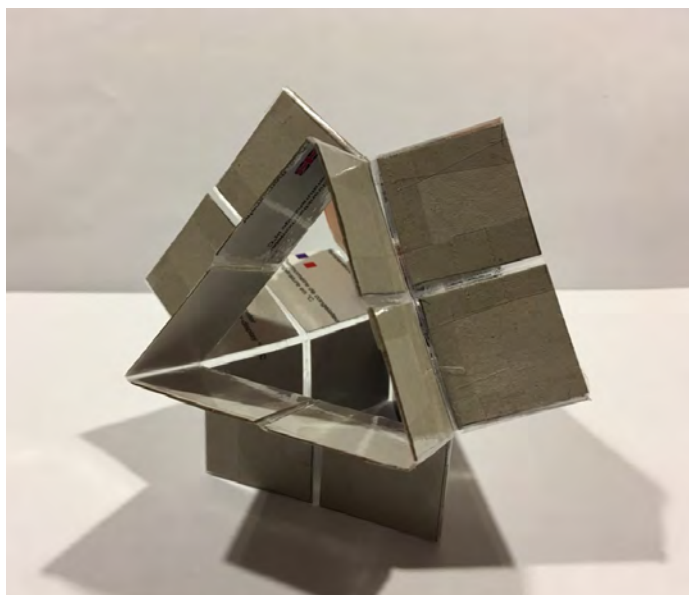
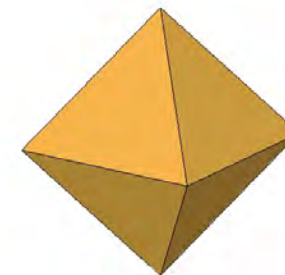
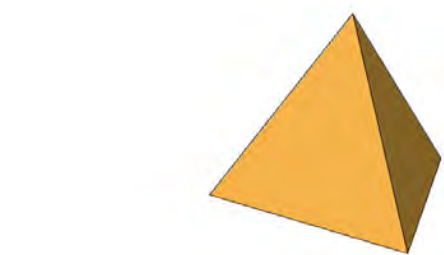
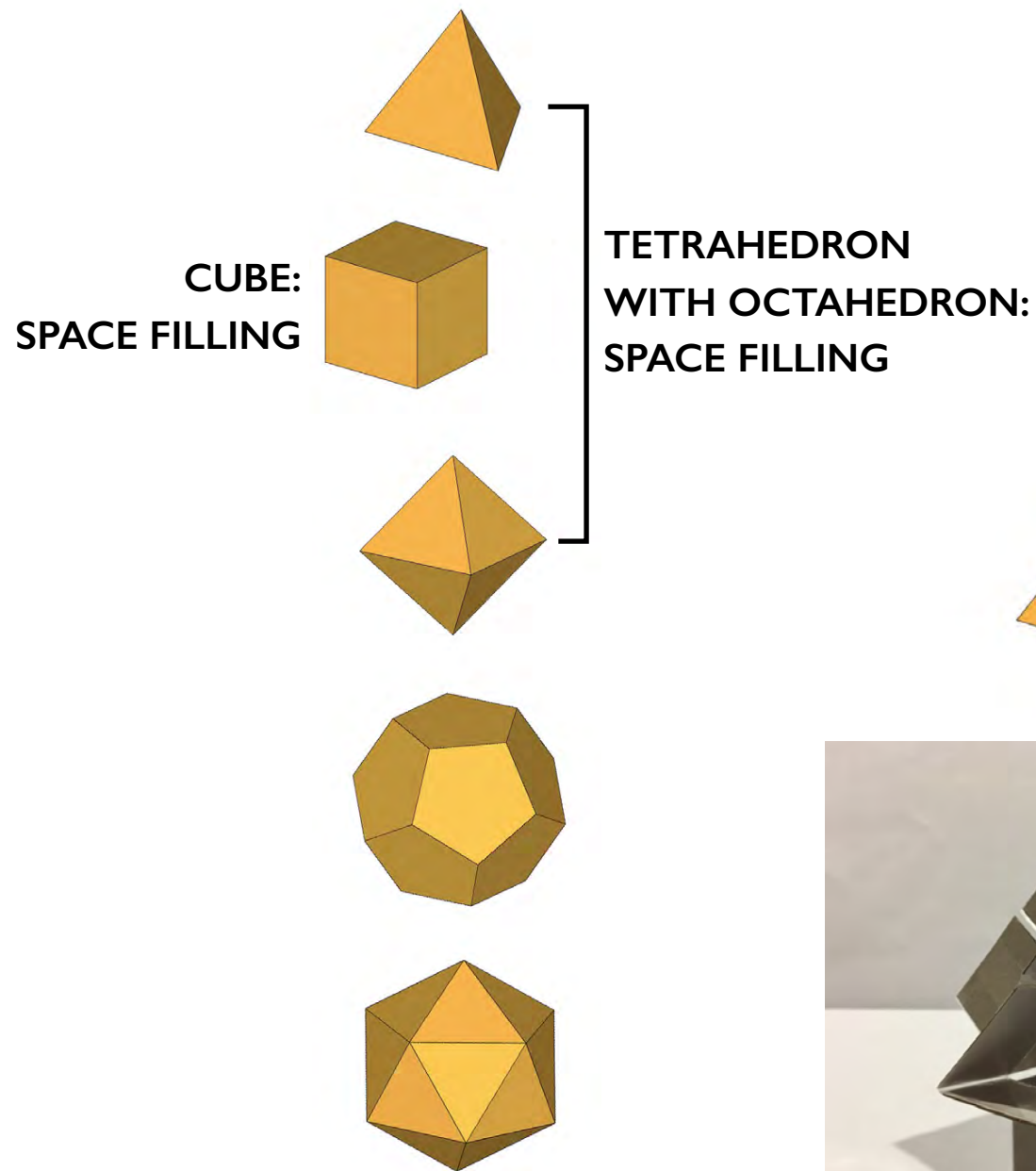
24 SQUARES



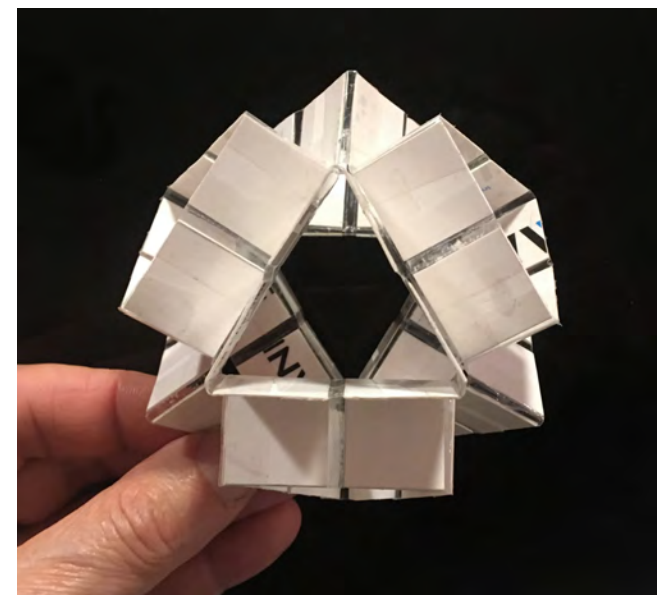
Mirrored plate split extrusion tetrahedron
Pino Trogu, Delft NL Dec. 5, 2017 (Based on a model by Giorgio Scarpa)



MIRRORED PLATE SPLIT EXTRUSION TETRAHEDRON – 48 RECTANGLES OF RATIO 2:1 – TROGU, 2017

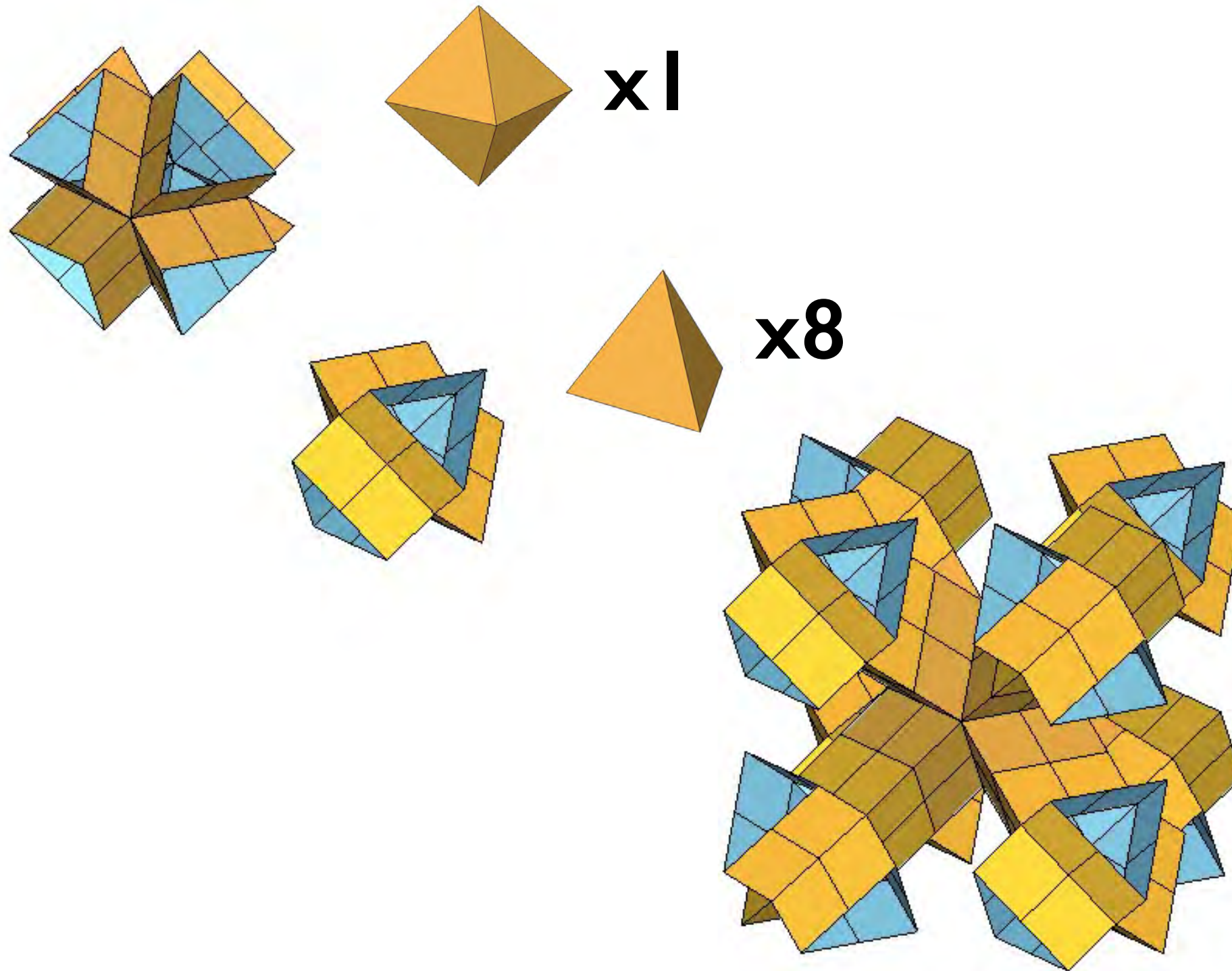


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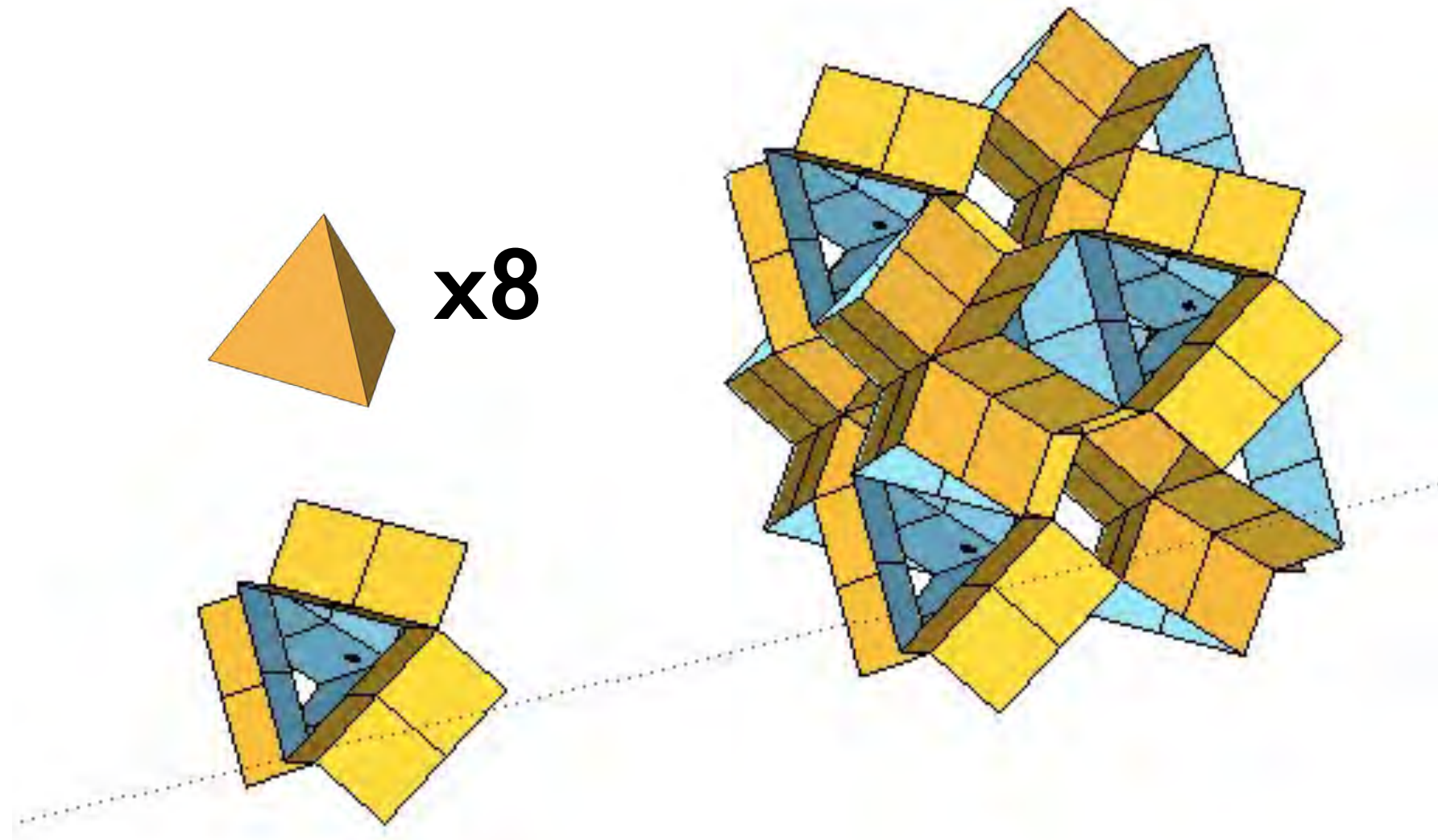


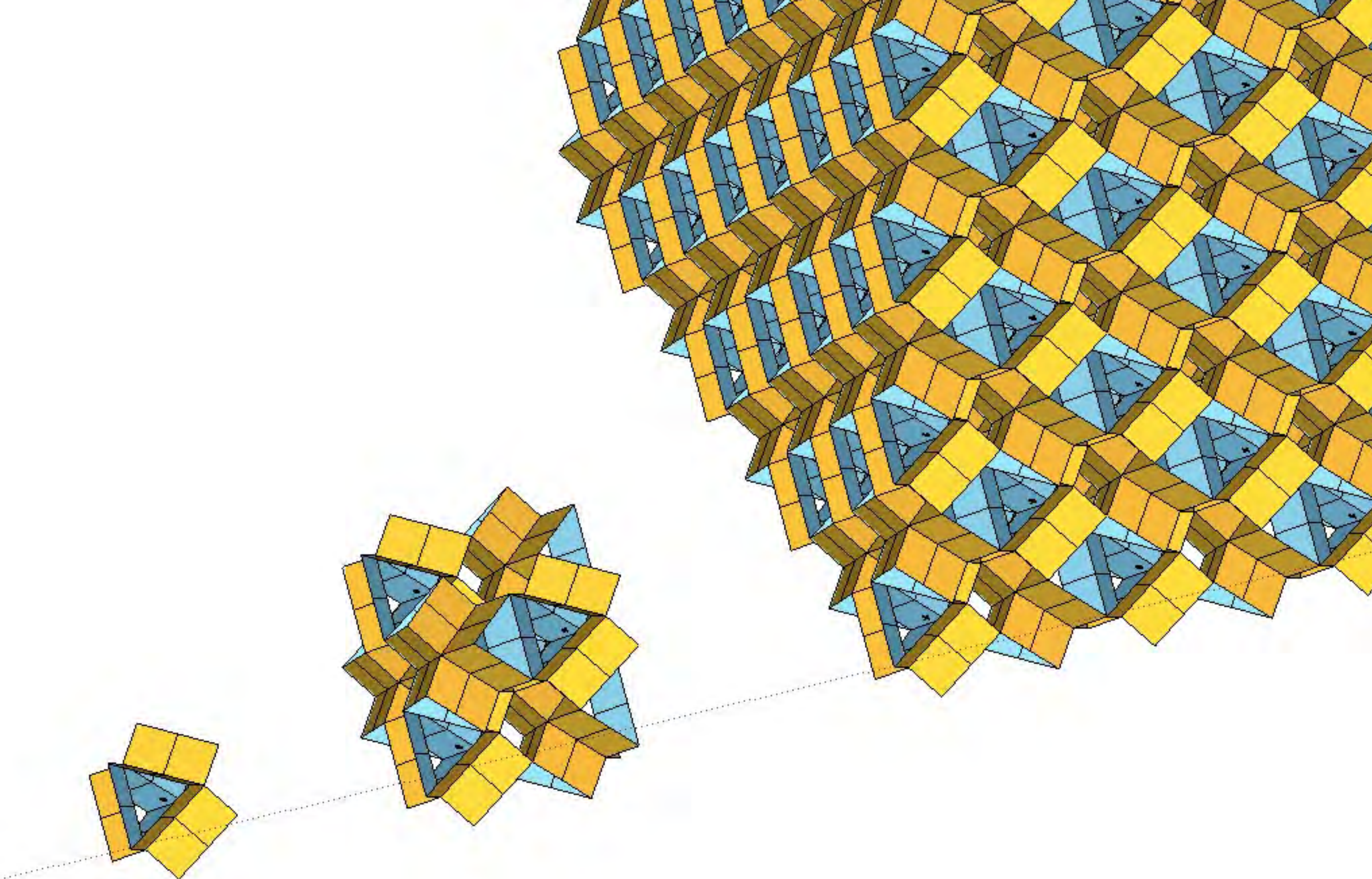
= ?

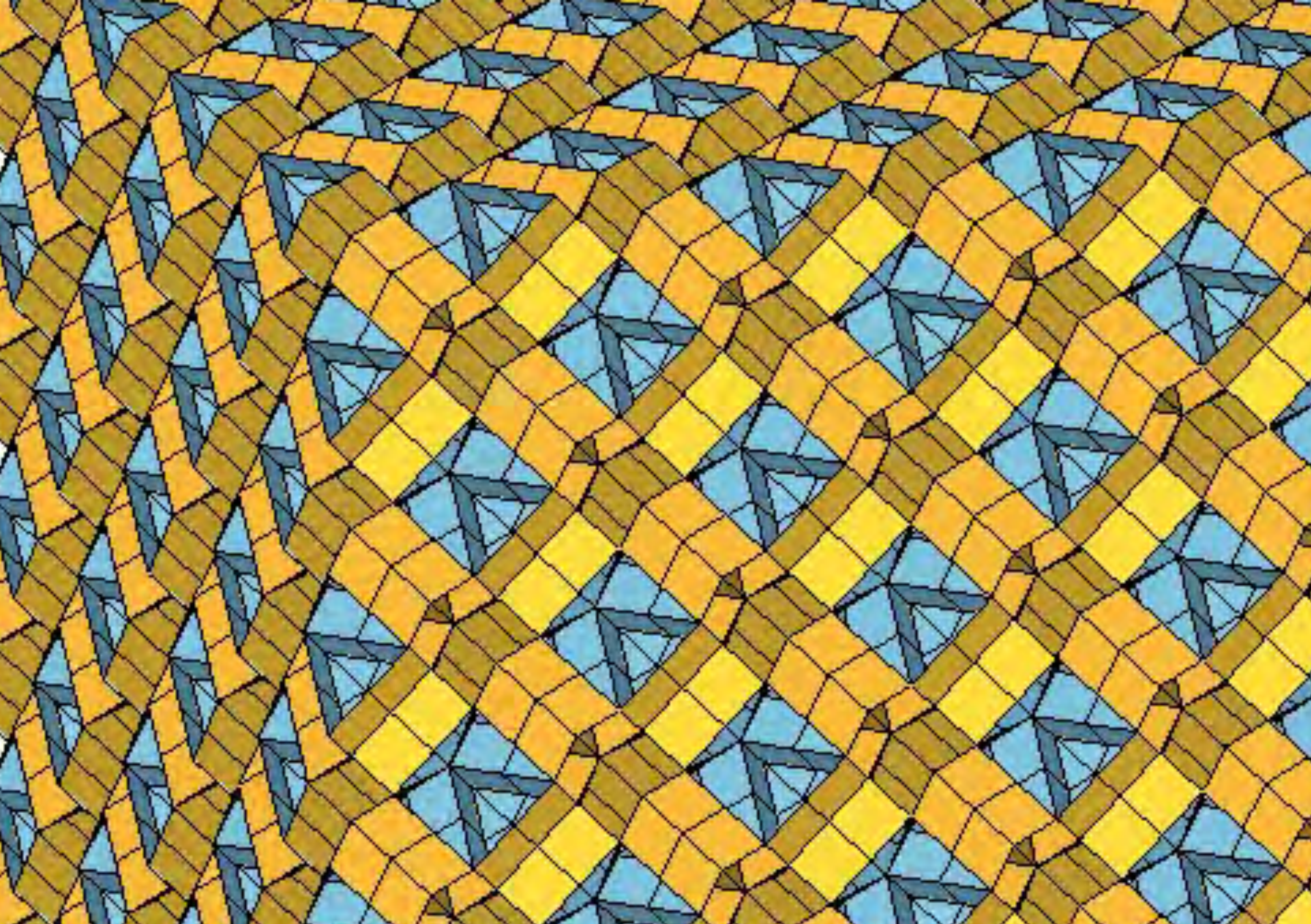
8 EXTRUDED TETRAHEDRONS AROUND ONE EXTRUDED OCTAHEDRON



8 EXTRUDED TETRAHEDRONS – ALL SQUARES ARE CONNECTED









WEB LINKS

online.sfsu.edu/trogu/scarpa/

Giorgio Scarpa
Italian designer, bionics researcher, teacher, and artist.

Profile and videos by **Pino Trogu**, San Francisco State University [trogu at sfsu dot edu]

The short videos below refer to the topics of Scarpa's two books. The first is a bionic study of the mouth apparatus of the sea urchin, also known as Aristotle's Lantern, after the first detailed study of it by the Greek philosopher. The PDF of book (unpublished draft English translation) is at right. The second shows one of the many "modular" chains described in the rotational geometry book, which focuses on rotational movement as a basic form generating process. Scarpa dissects the five Platonic solids and other solids into chains of hinged triangular pyramids that fold back into their enclosure cells. Both books were published as part of a new out-of-print series called "Design Notebooks", edited by the Italian designer Bruno Munari. The covers of the books in that series are shown below. The other videos show more topological and bionic studies by Scarpa, including DNA models and studies of muscle structure.

This page was last updated on Tuesday, May 27, 2014.

Bionic Model of Aristotle's Lantern
Video length: 1'12".
Click [here](#) to download PDF of pages 3-20 and 60- only.
File size: 12MB.

Citations:
[Bioinspired Spring-Loaded Bionic Harvester — Experimental Prototype Design and Feasibility Study](#)
Filip Jelitok, Gerwin Smit and Paul Breedveld
Journal of Medical Devices 8(1), March 2014.

Model of Aristotle's Lantern
Video length: 1'12". Video: Pino Trogu, 1994.

Modelo book. Unpublished English translation of Italian Edition: *Modelli di Bionica*, 1985.
Translated by Pino Trogu. 122 pages
File size: 58MB.

CONFERENCE PAPER (PDF 5MB)
[Rotational Geometry as a Teaching Tool: Applying the Work of Giorgio Scarpa \(Article\)](#)
DRS // CLMULUS 2013.
2nd International Conference for Design Education Researchers.
Oslo, 14-17 May 2013.

Click image to download PDF of complete Bionic Modelo book. Unpublished English translation of Italian Edition: *Modelli di Bionica*, 1985.
Translated by Pino Trogu. 122 pages
File size: 58MB.

Click here to download PDF of a sample of Mary Viera's student work from the Kunstgewerbeschule, Basel, 1966-1967.
Various sections of the cube.

Cubic chain of 24 modules. Designed by Florence Tison. (2012) San Francisco State University. Fall 2012
Instructor: Pino Trogu. The design of the chain follows

bocalorenzo.blogspot.it/2016/05/giorgio-scarpa-catena-formata-da-48.html

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ARTE ARCHITETTURA

il blog di un architetto, professore della scuola media italiana, soprattutto pittore

giovedì 5 maggio 2016

Giorgio Scarpa: catena formata da 48 moduli

Catena a forma di anello costituita da 48 moduli speculari.
Modello di Giorgio Scarpa realizzato dagli alunni della classe 3A, Scuola Secondaria di Primo Grado di Offanengo, Cremona, Italia (da "Modelli di Geometria Rotatoria", di Giorgio Scarpa, 1978, Quaderni di Design n. 5, a cura Bruno Munari, Zanichelli, Bologna)
La forma cubica è il minimo spazio occupato dalla catena.

INFORMAZIONI PERSONALI

Lorenzo Bocca
Docente nella Scuola Secondaria di Primo Grado, Architetto amante dell'Arte, soprattutto Pittore, scienziato del bello creativo, ogni volta allievo e amico di Alberto Saffron, allievo della opera di Francesco Bernini, vicino al pensiero di Escher, fan di Franco Albini, debite verso le ricerche di Paul Scheffer Truchet, studioso di Giorgio Scarpa, personalmente vagante tra le celle esagonali della Biblioteca di Babele.
Visualizza il mio profilo completo

DIRITTO D'AUTORE
Questo blog, oltre al materiale realizzato da me, è...

bocalorenzo.blogspot.it

trogu.com

Pino Trogu
Last update: 18 Sep 2017

Academic work
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Giorgio Scarpa's Model of a Sea Urchin Inspires New Instrumentation

Posted September 16, 2017
Leonardo Journal, MIT Press

Abstract: Giorgio Scarpa (1938-2012) was an Italian designer, artist and teacher who worked in bionics, topology and rotational geometry. This article describes Scarpa's bionic model of "Aristotle's Lantern"—the mouth of ...
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Posted September 11, 2017
Design Issues, MIT Press

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Data Visualization Class Blog

Posted September 10, 2017
523informationdesign.blogspot.com

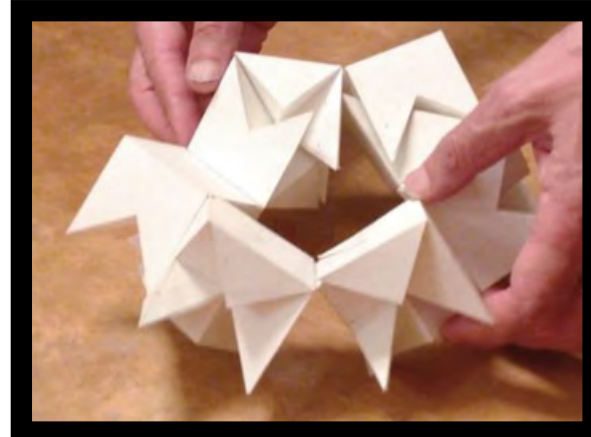
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VIDEO



[Scarpa-- Aristotle's lantern video](#)



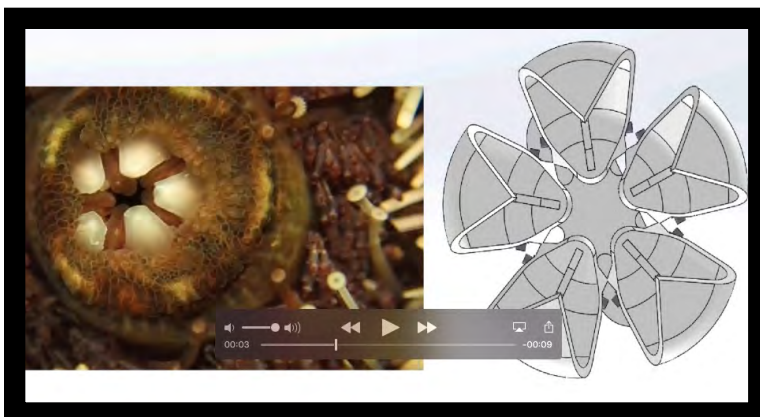
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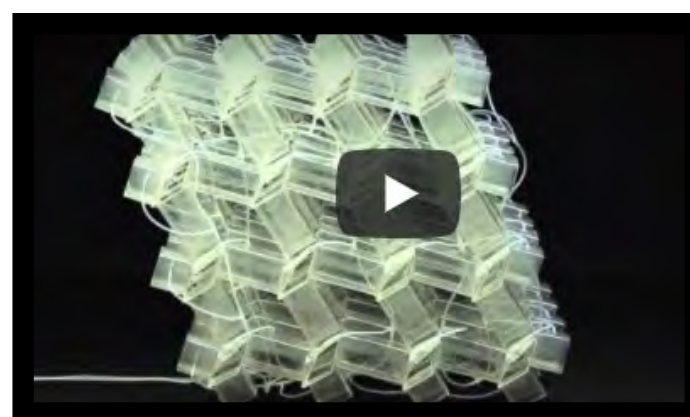
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[Scarpa -- "I forget" video](#)



[Frank UCSD -- urchin side-by-side video](#)



[B. Overvelde -- Metamaterials](#)

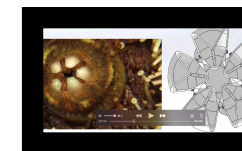
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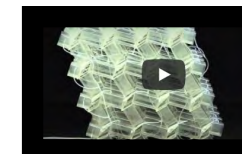
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THANK YOU

PINO TROGU

BIO-INSPIRED MODELS OF ROTATIONAL GEOMETRY



Giorgio Scarpa & Pino Trogu, 1988

MODELS BASED ON GIORGIO SCARPA'S WORK
IN TOPOLOGY, BIO-INSPIRED DESIGN, AND ROTATIONAL GEOMETRY

TU DELFT – FACULTY ROOM (LAGERHUYSCHE) AT 3ME
THURSDAY, 21 DECEMBER 2017 – 12:45 PM

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