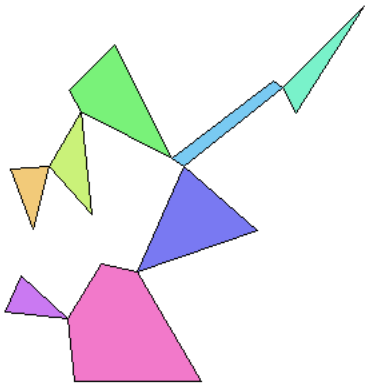
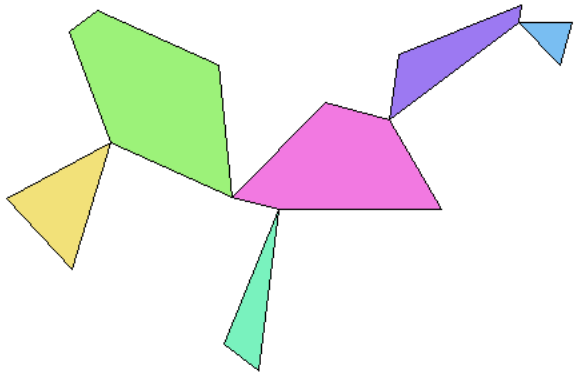
Is there software for hinged dissections?

frame = 0 sec
frame = .02 sec
frame = .04 sec
frame = .1 sec
pause = 0 sec
pause = 1/2 sec
pause = 1 sec
pause = 2 sec

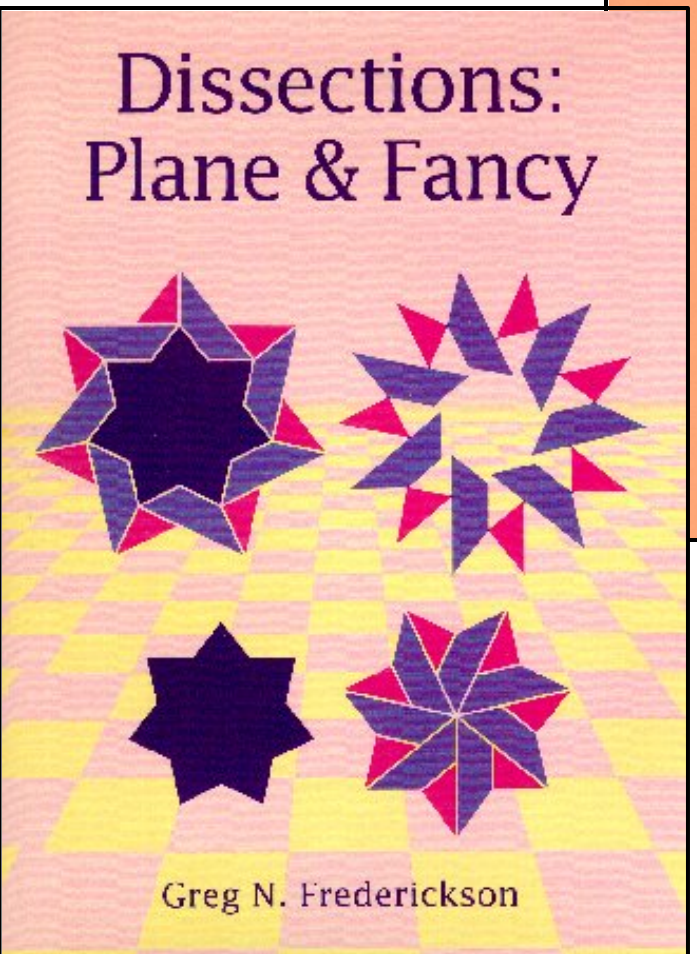


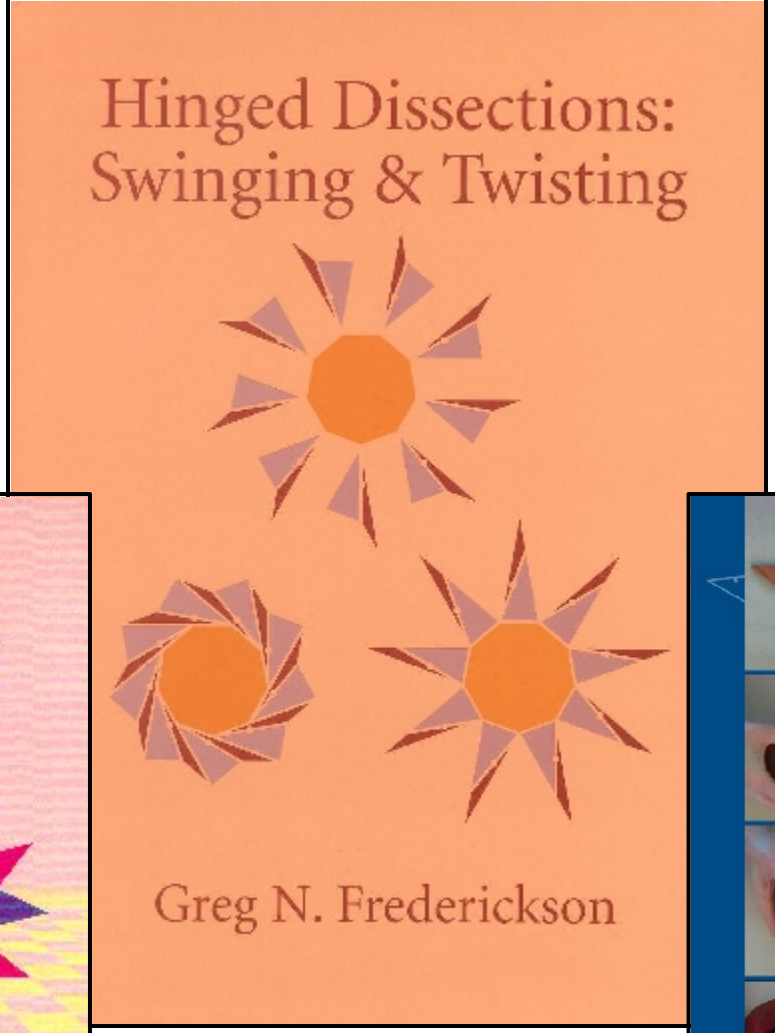
[Mabry 2005]

frame = .1 sec
pause = 0 sec
pause = 1/2 sec
pause = 1 sec
pause = 2 sec



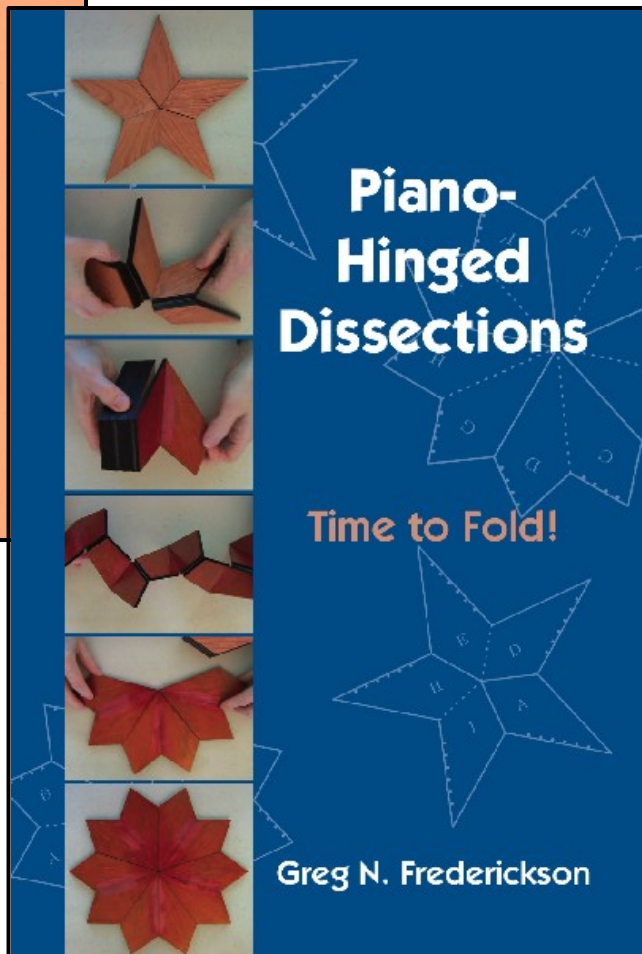
1997





2002

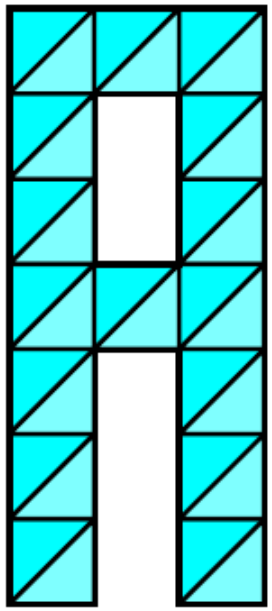
2006

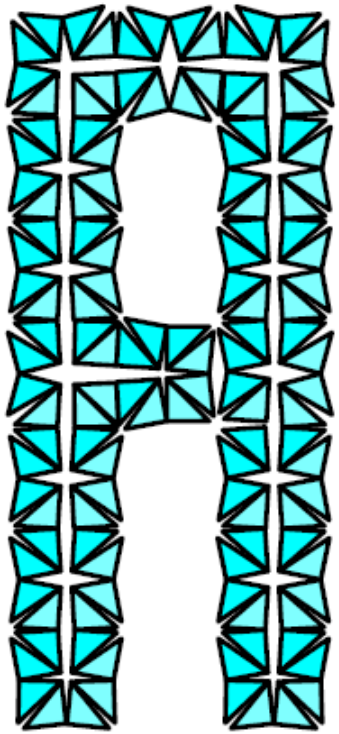


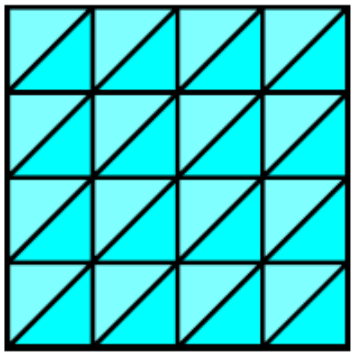
“Hinged alphabet”

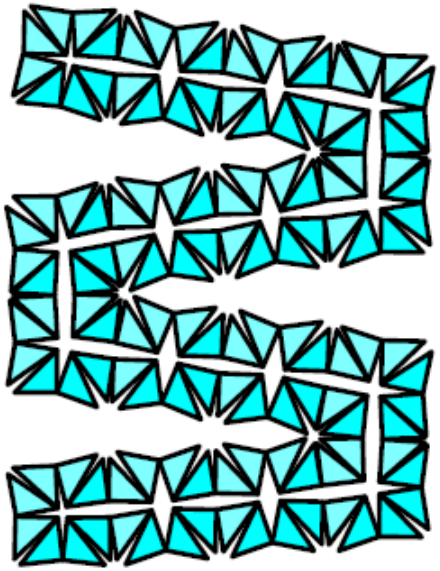
Erik & Martin Demaine

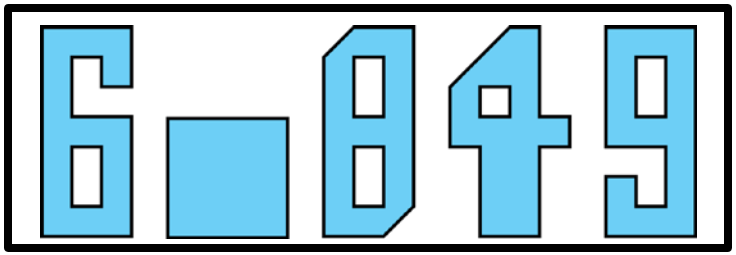
2003

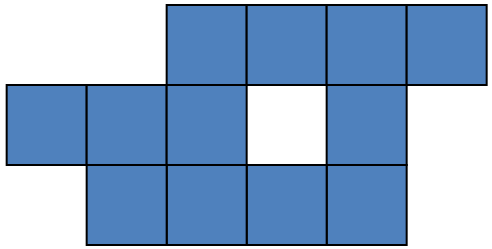
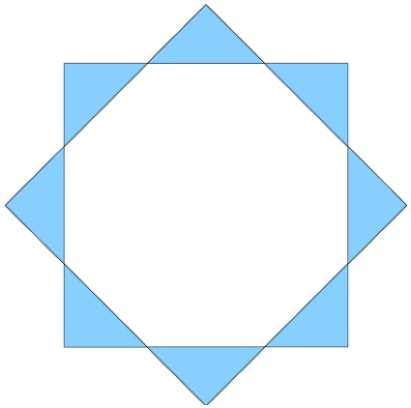
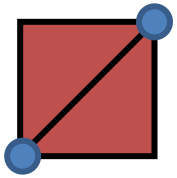
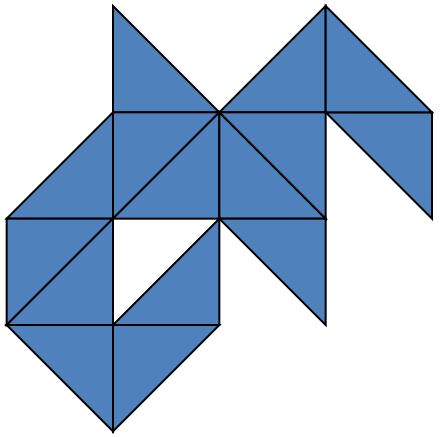
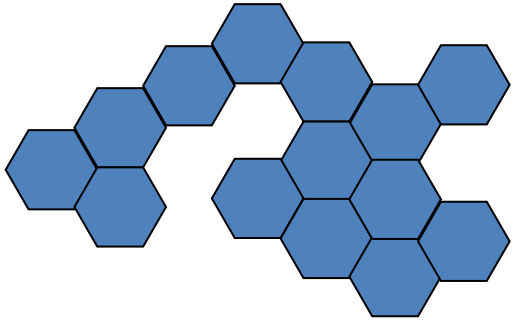
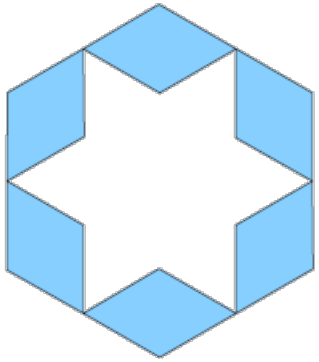
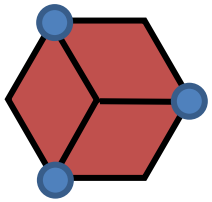
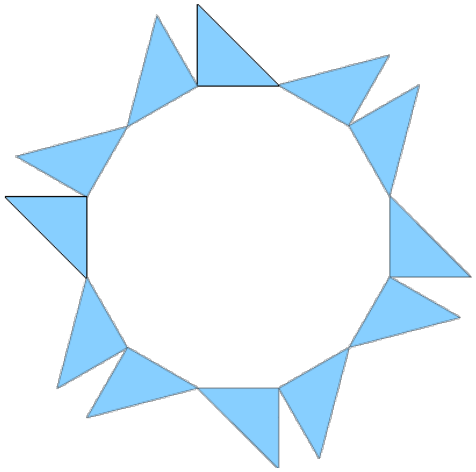
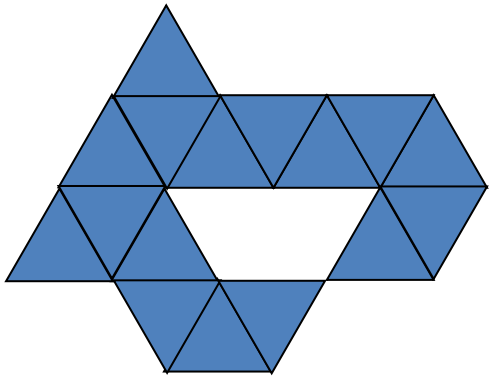
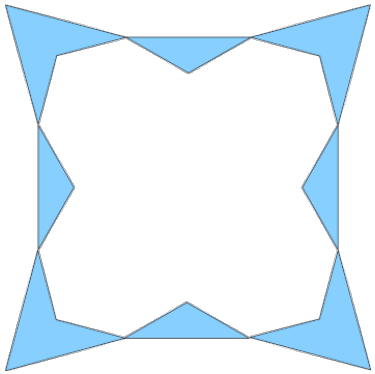
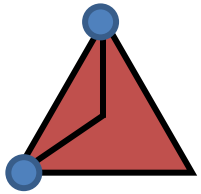
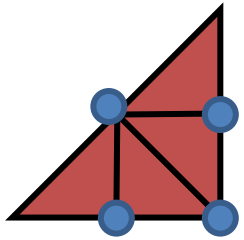






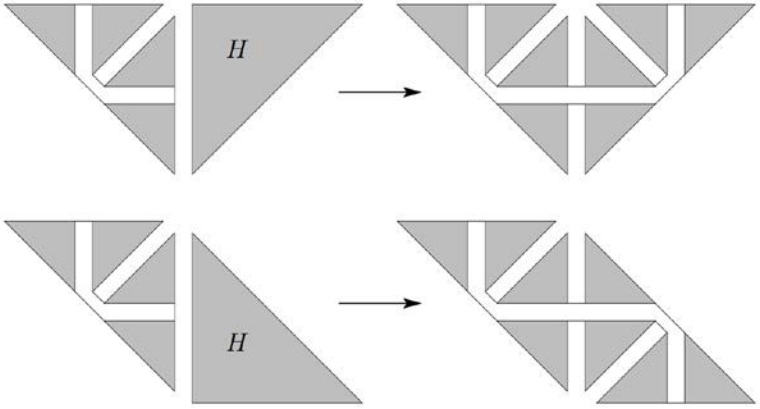


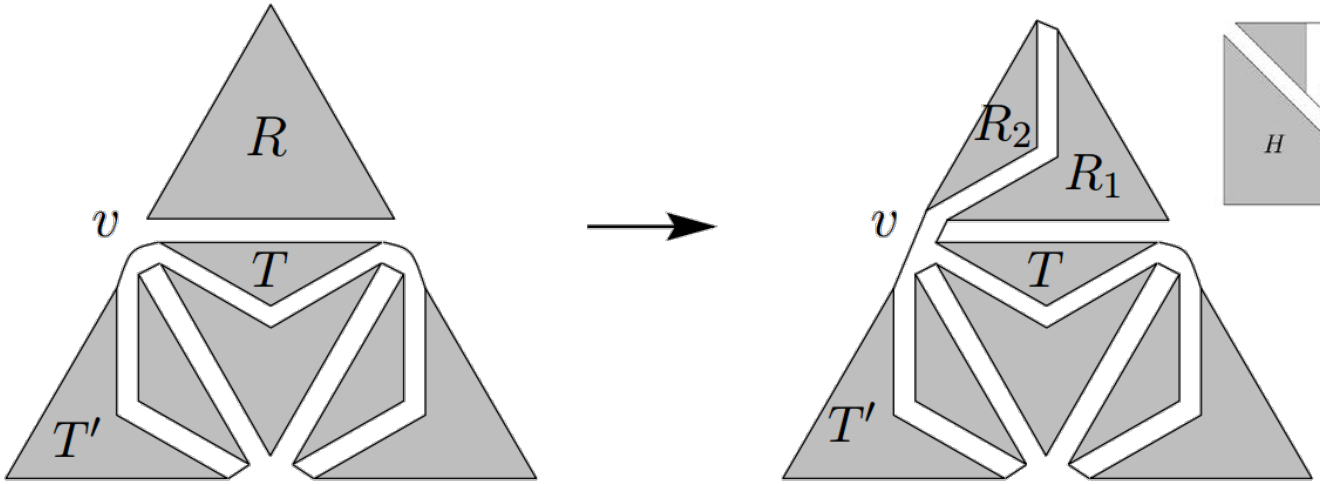


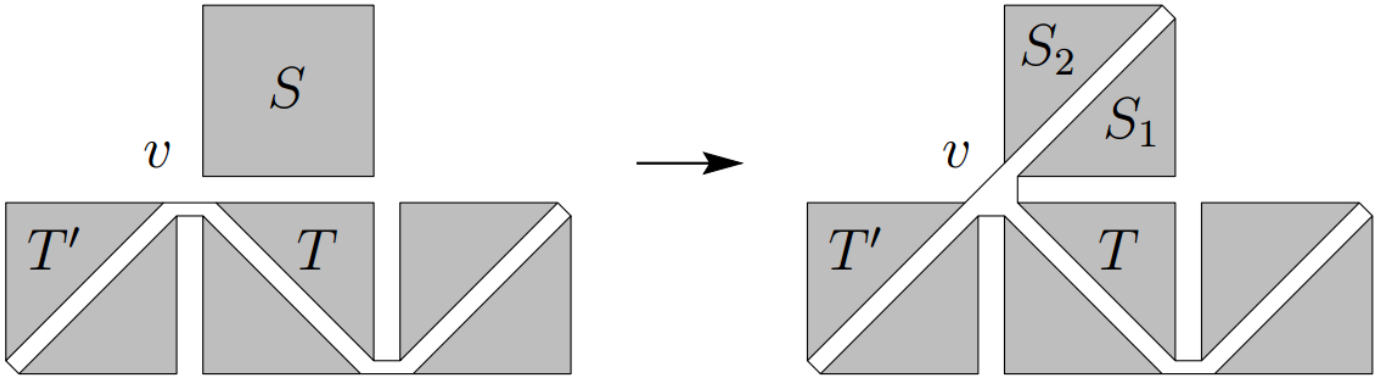













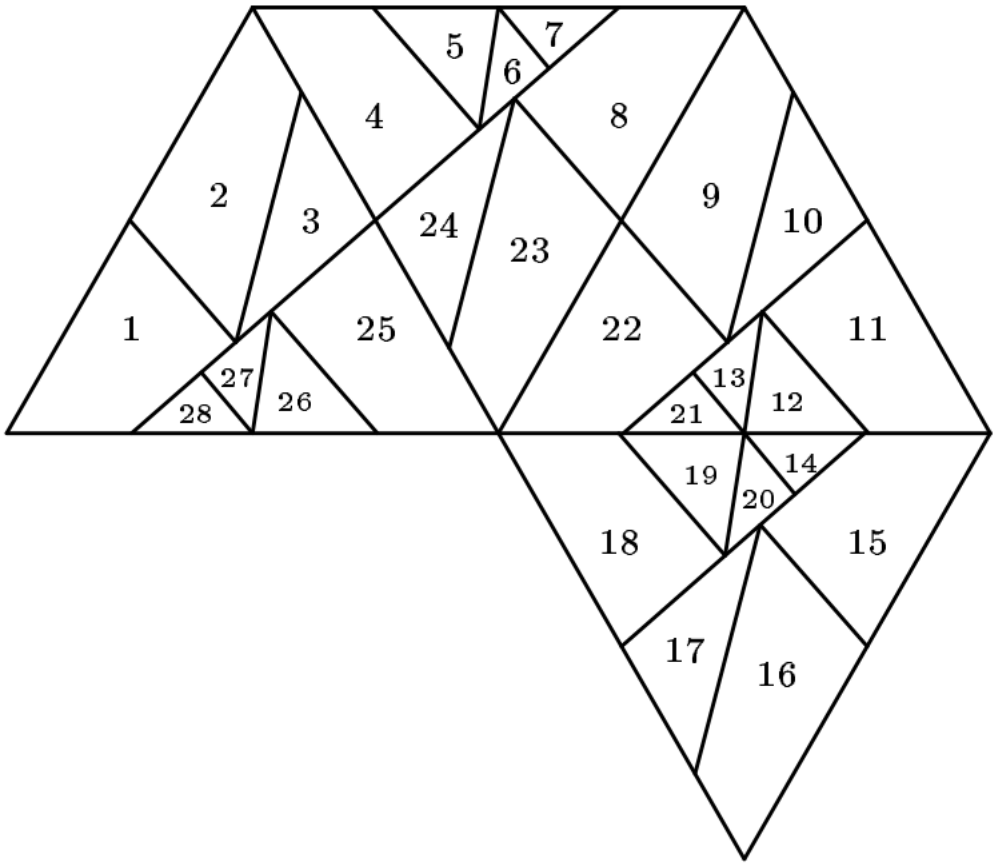
[Demaine, Demaine, Eppstein, Frederickson, Friedman 1999/2005]

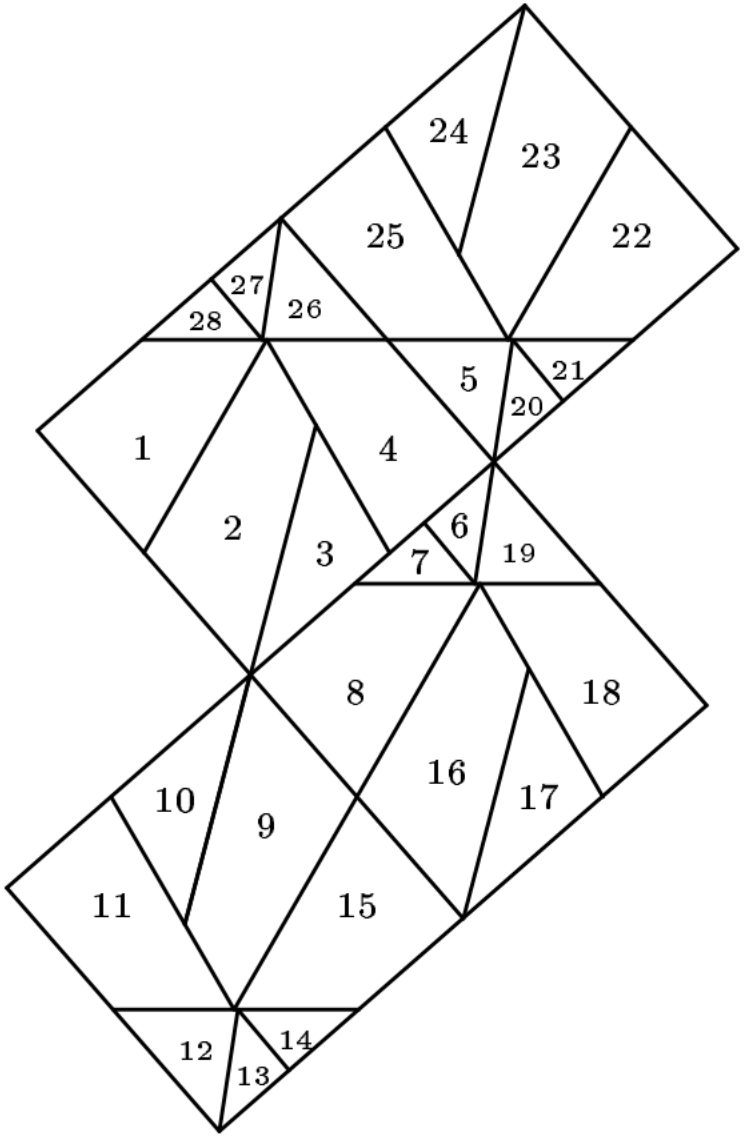
[Demaine, Demaine, Eppstein, Frederickson, Friedman 1999/2005]



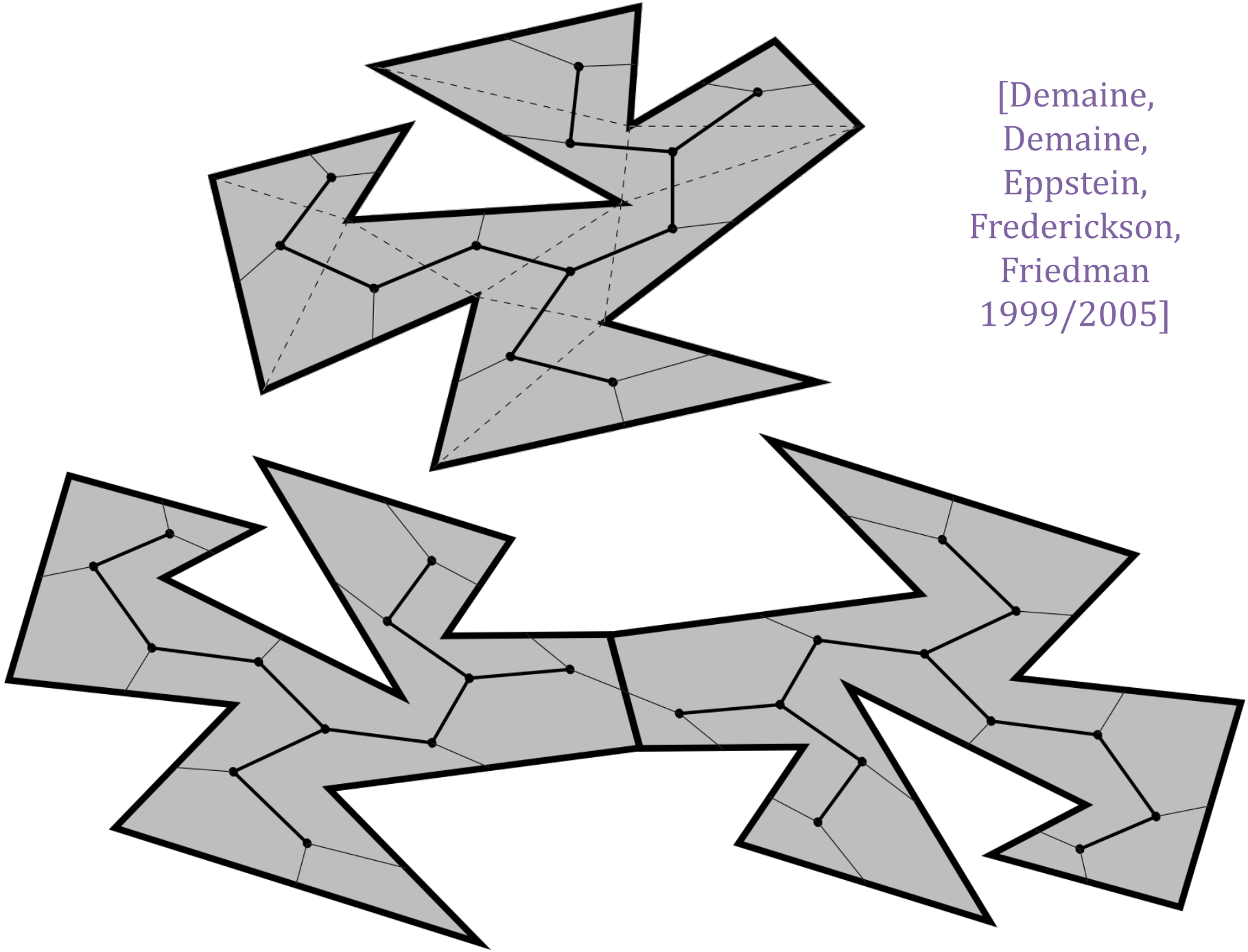




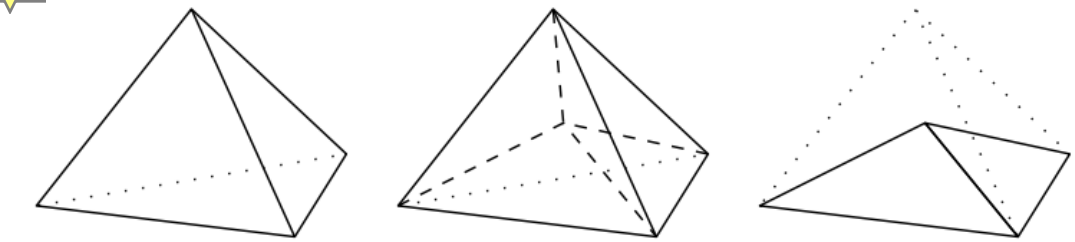


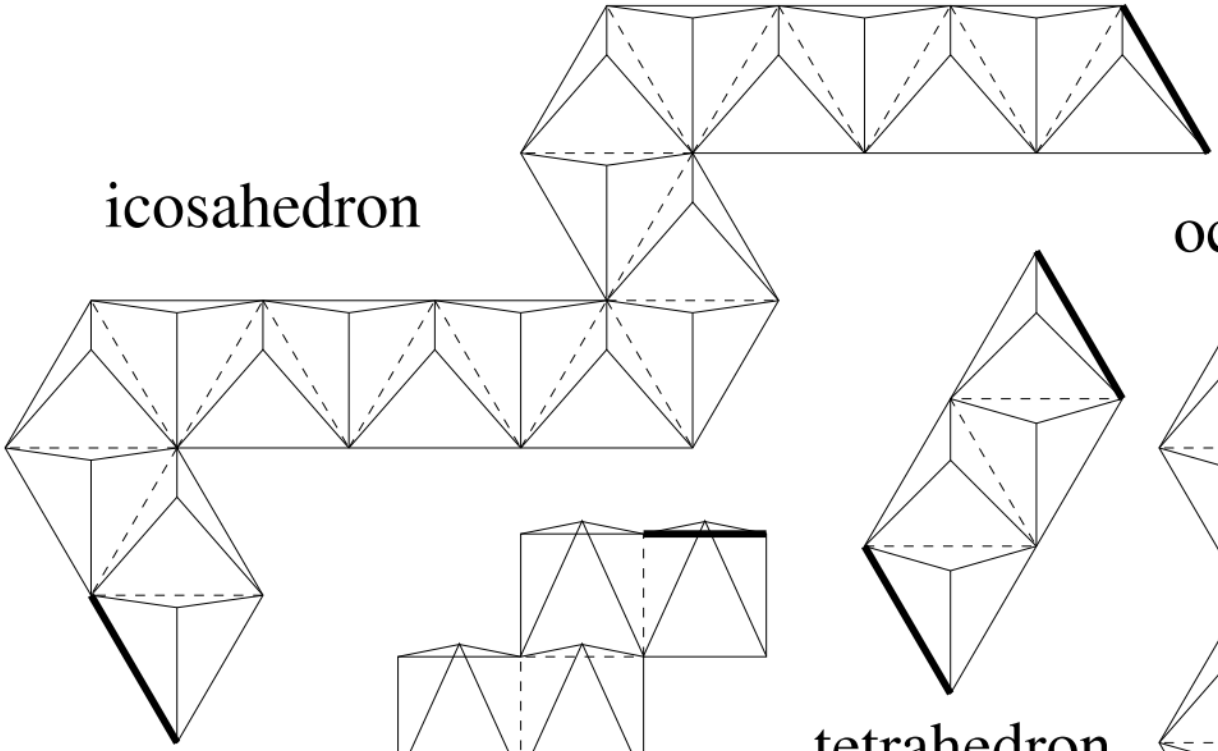


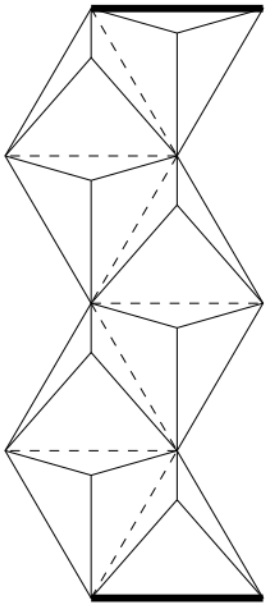
[Demaine, Demaine, Eppstein, Frederickson, Friedman 1999/2005]

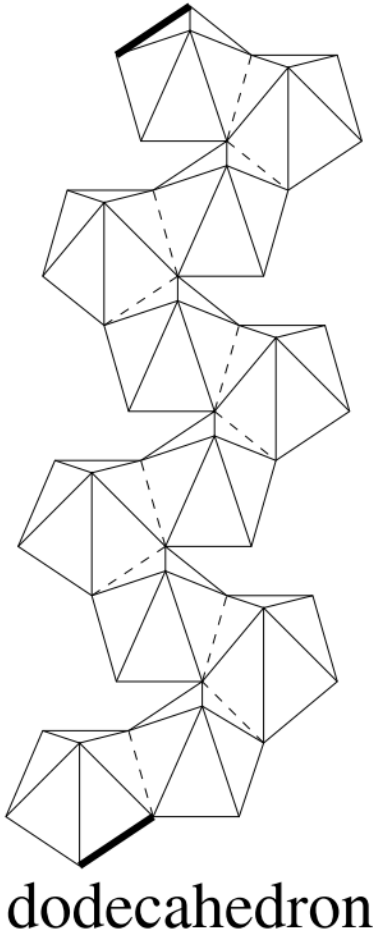


[Demaine, Demaine, Eppstein, Frederickson, Friedman 1999/2005]

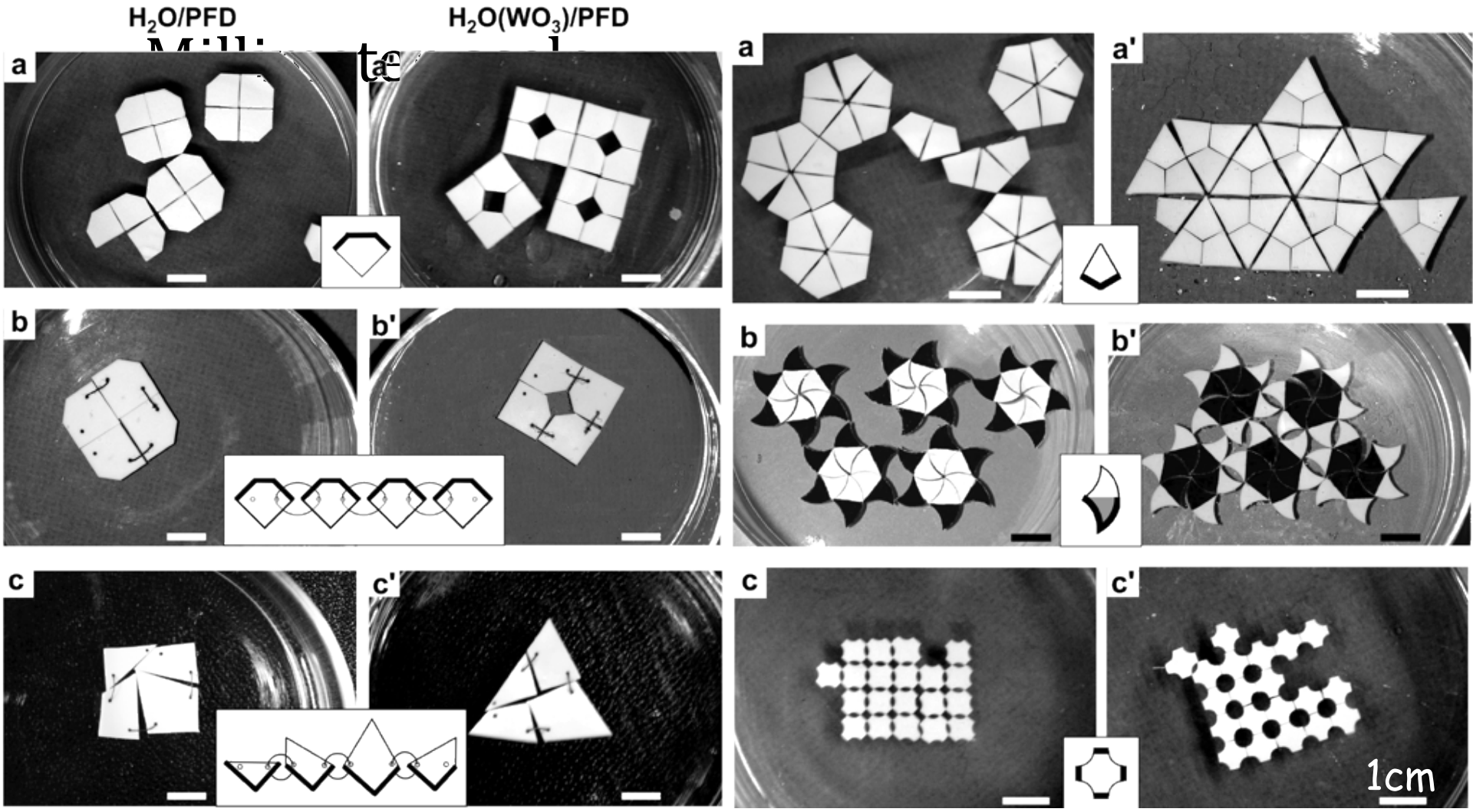




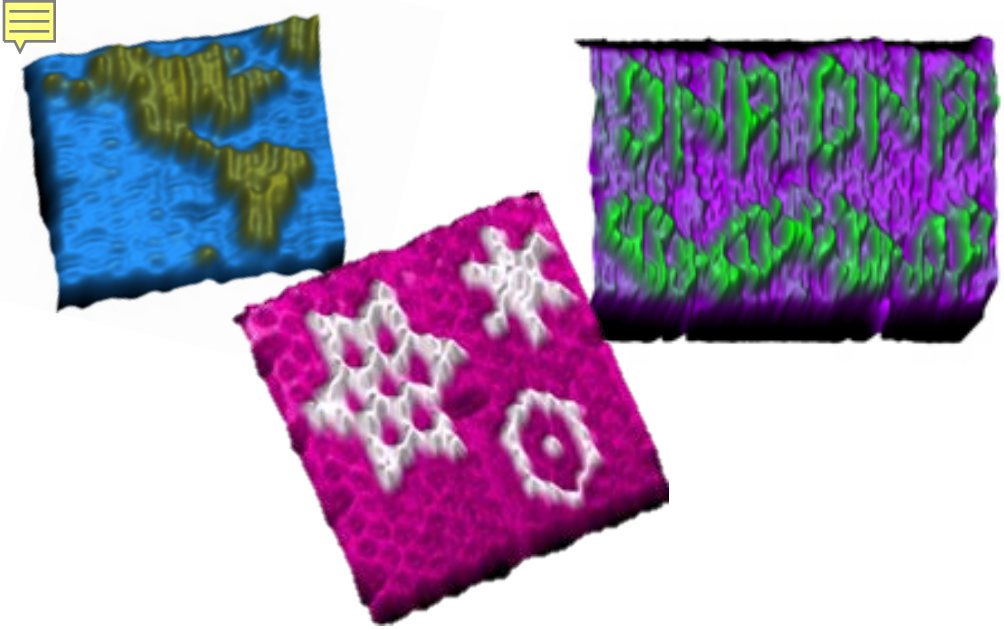




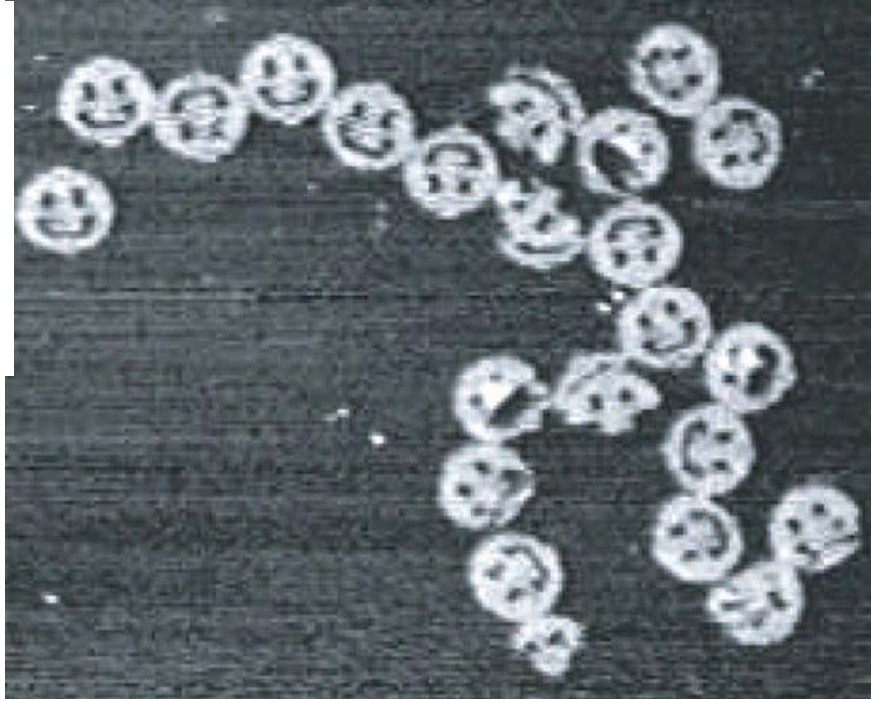
[Demaine, Demaine, Lindy, Souvaine 2005]

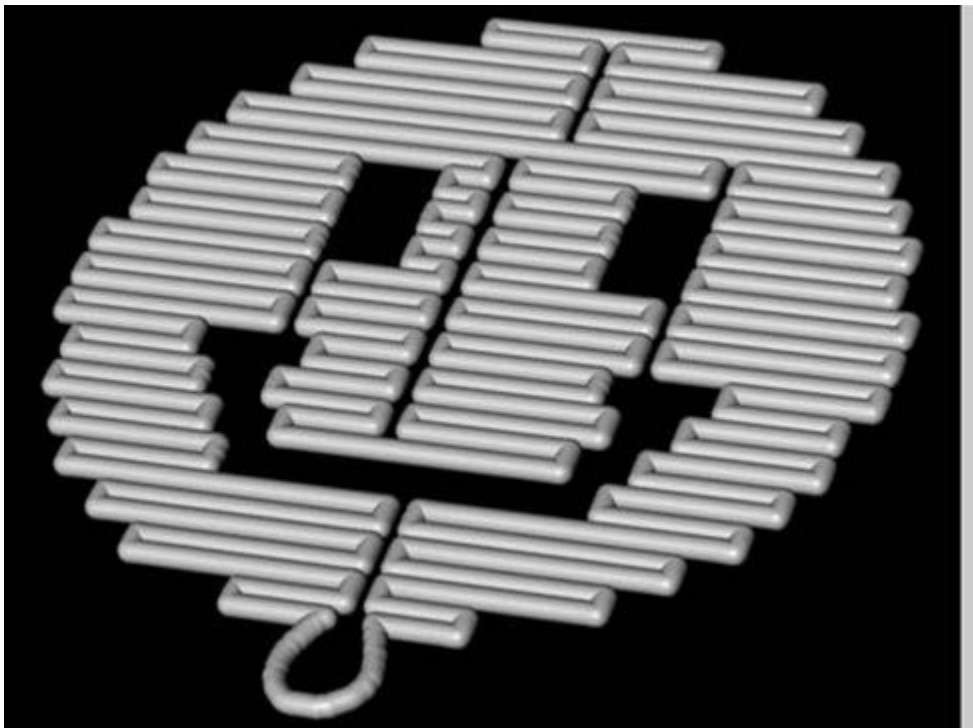


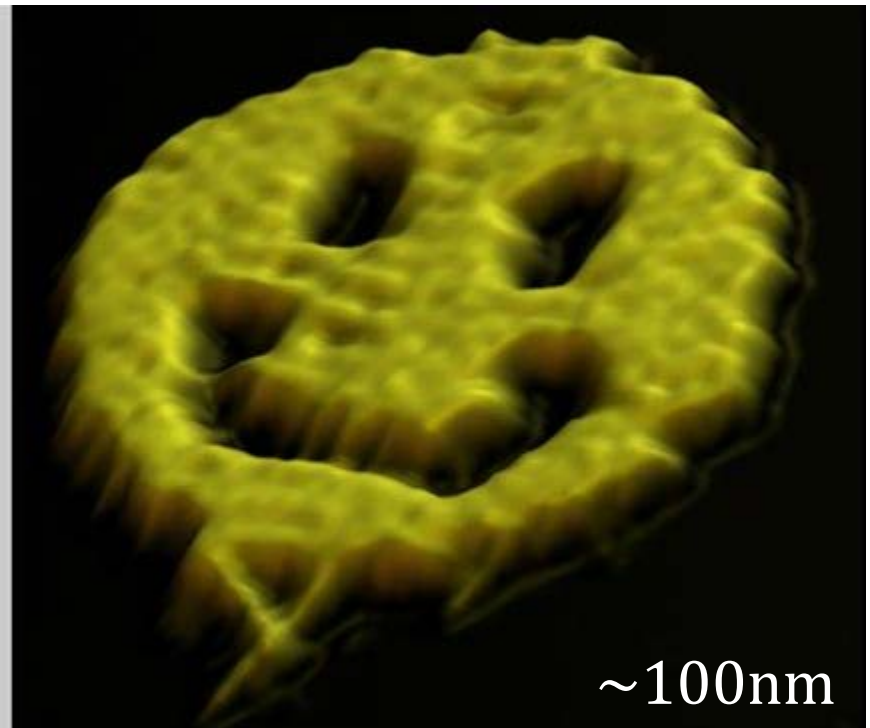
[Mao, Thalladi, Wolfe, Whitesides, Whitesides 2002]



[Rothemund — Nature 2006]

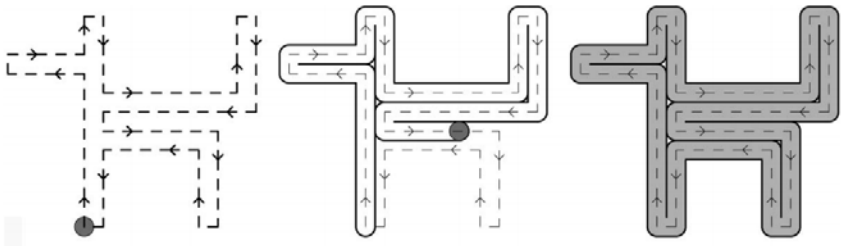




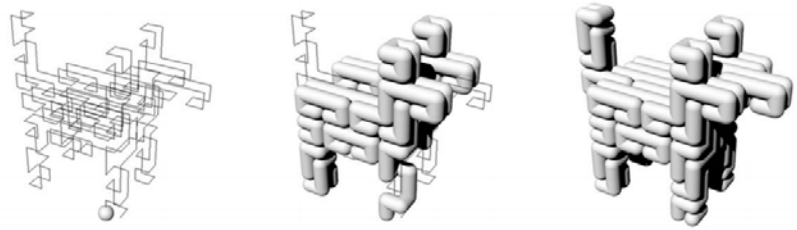


Programmable Assembly With Universally Foldable Strings (Moteins)

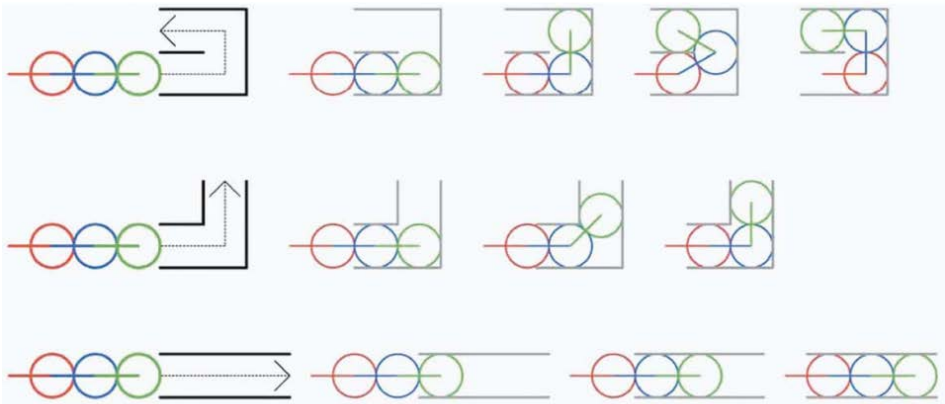
Kenneth C. Cheung, Erik D. Demaine, Jonathan R. Bachrach, and Saul Griffith



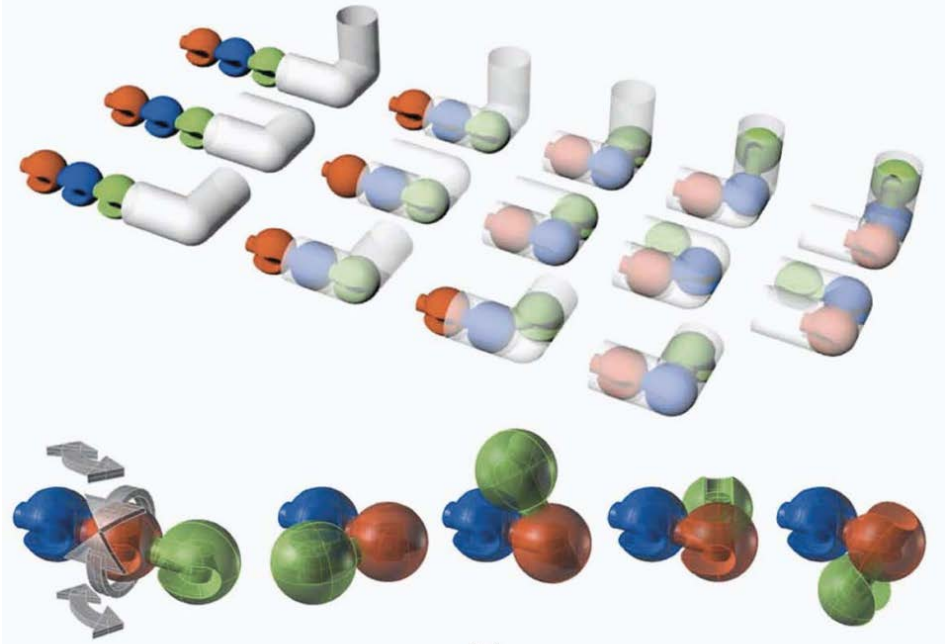
(a)



(b)



(a)

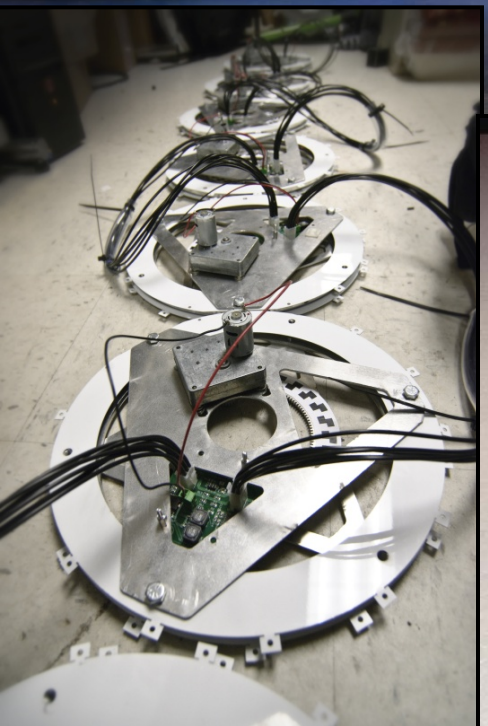


(b)

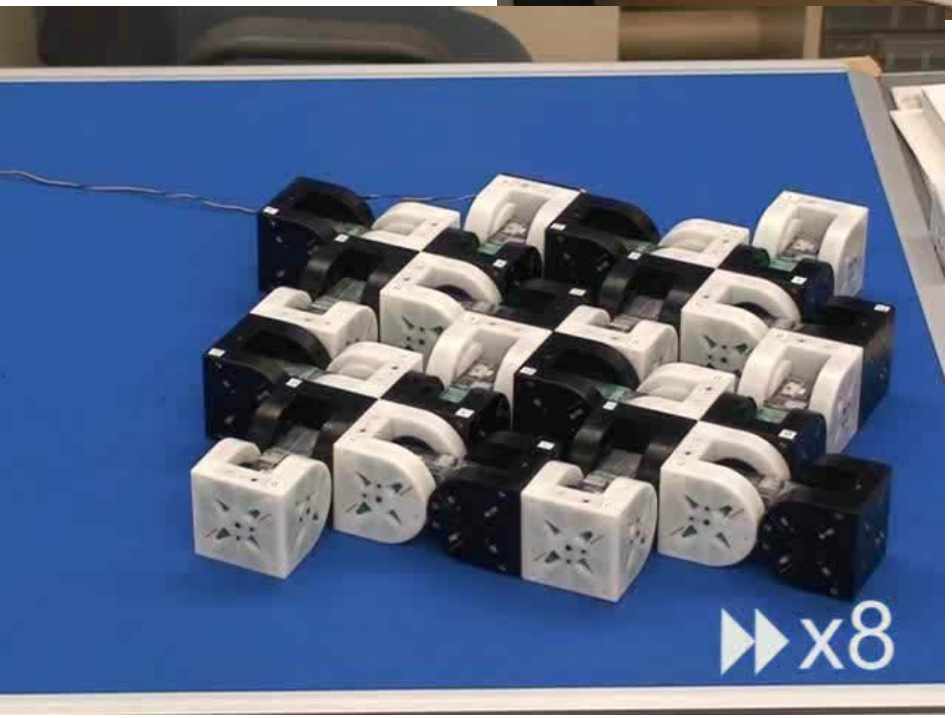
Macrobot MIT Center for Bits & Atoms

Decibot, 144″ × 18″ × 18″

MIT Center for Bits & Atoms



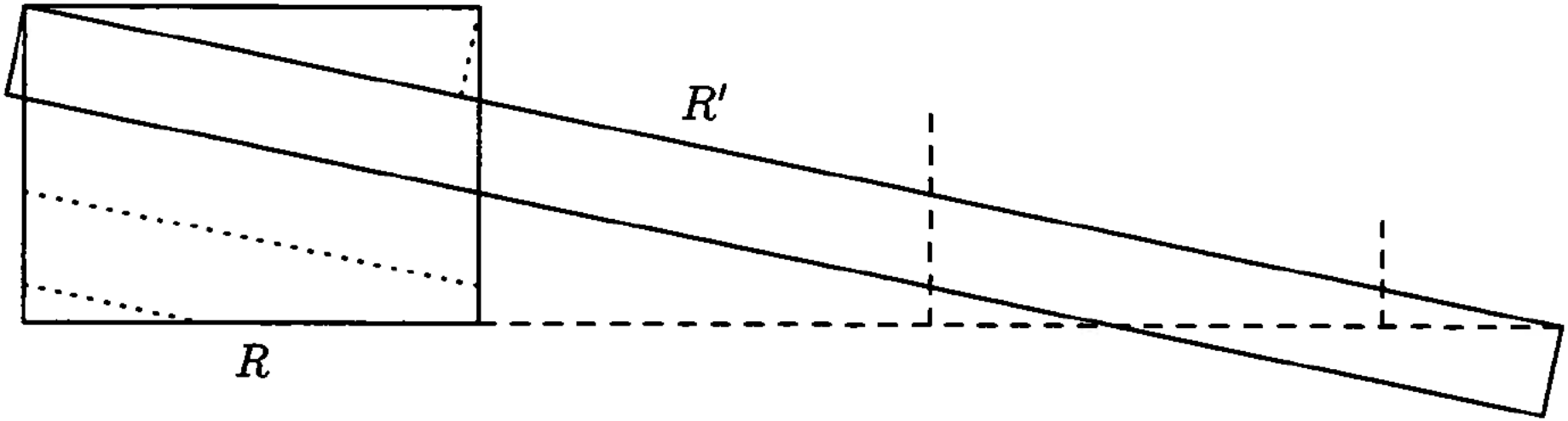
Crystalline (3x) [Dartmouth/ MIT 2001]



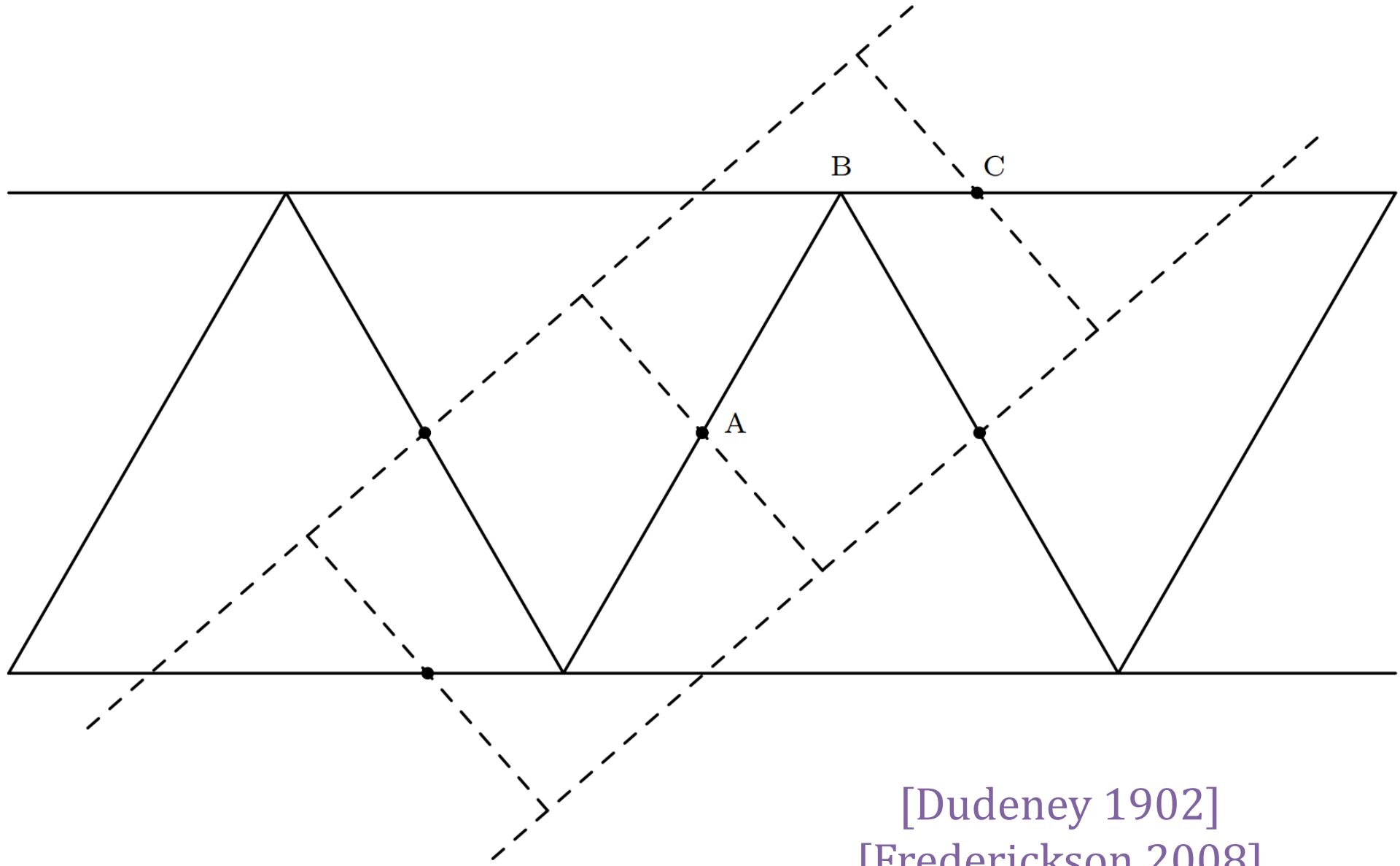
M-TRAN (8x) [Tokyo 2002–2006]

Molecubes (4x) [Cornell 2005]

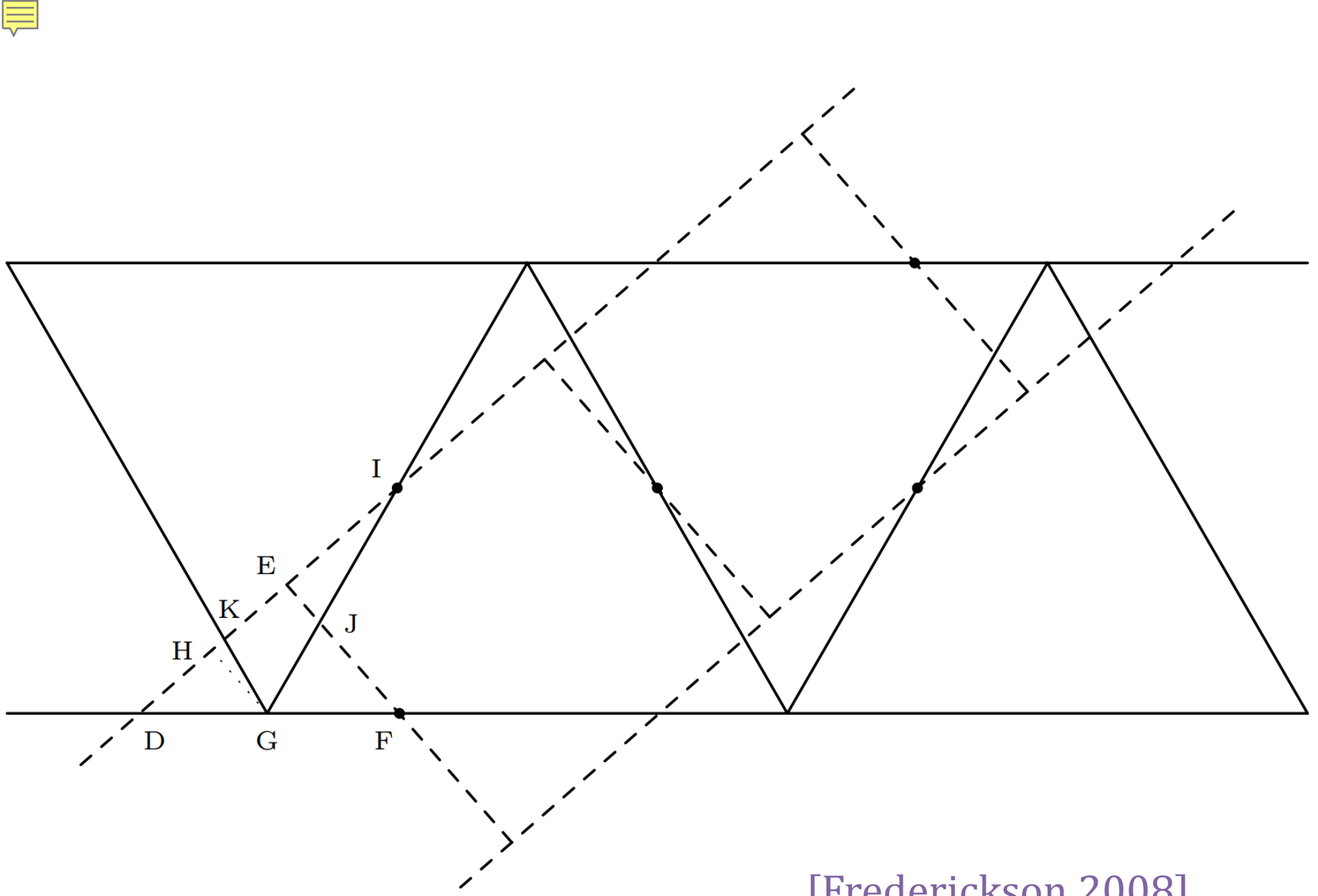
Can we see the dissection of a rectangle into a rectangle of another height?



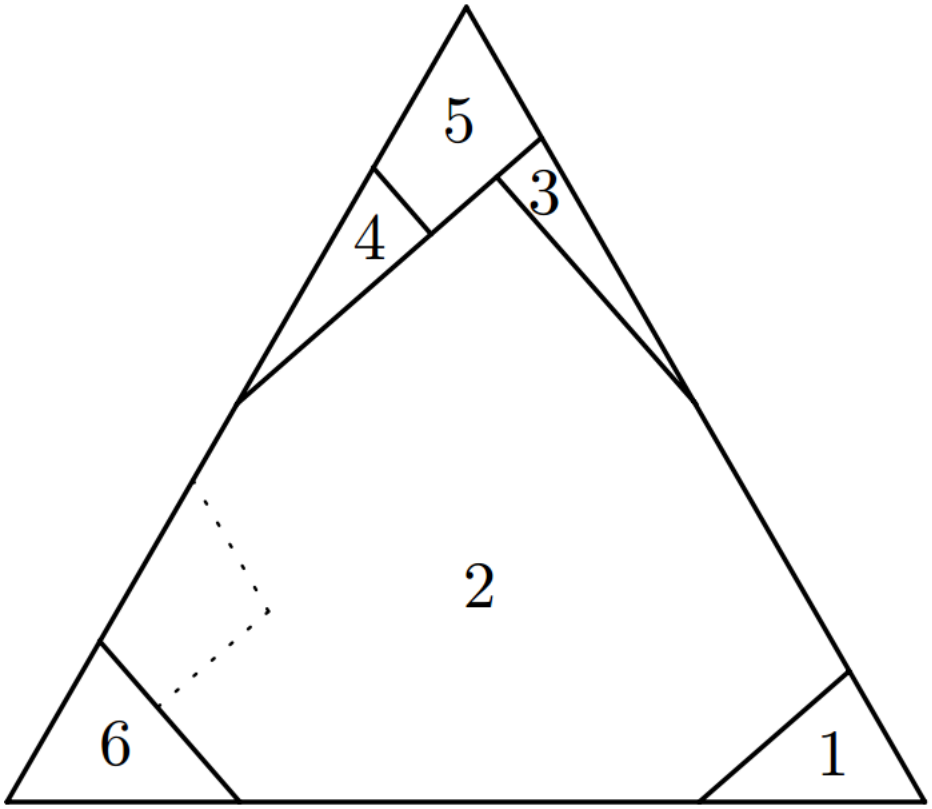
[Montucla]
[Ozanam 1778]
[Frederickson 1997]

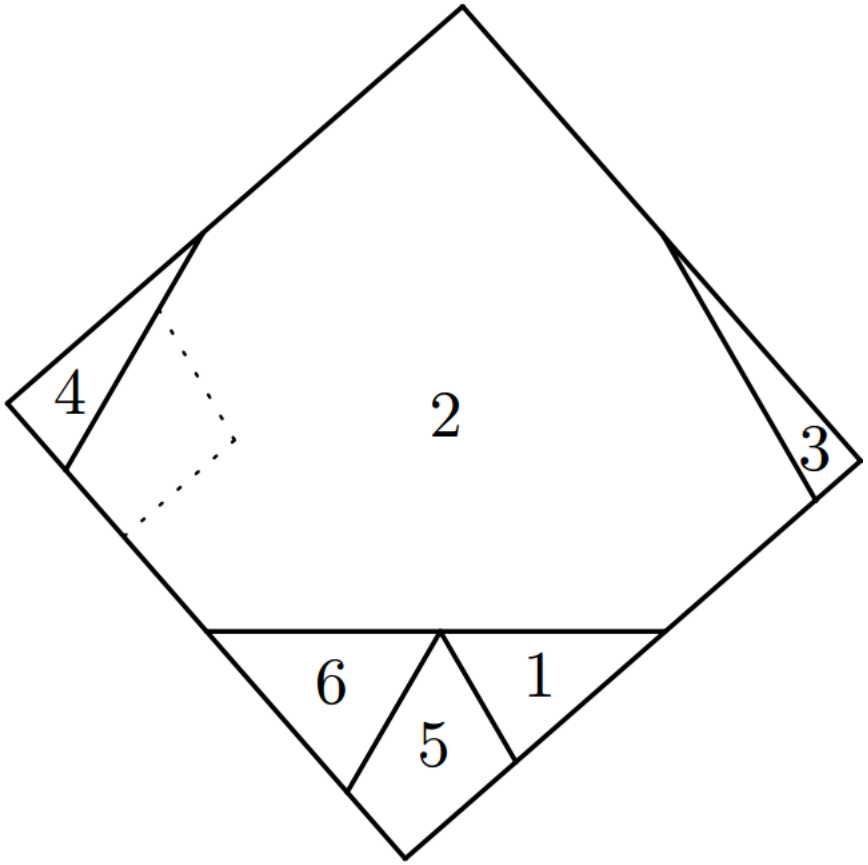


[Dudeney 1902]
[Frederickson 2008]

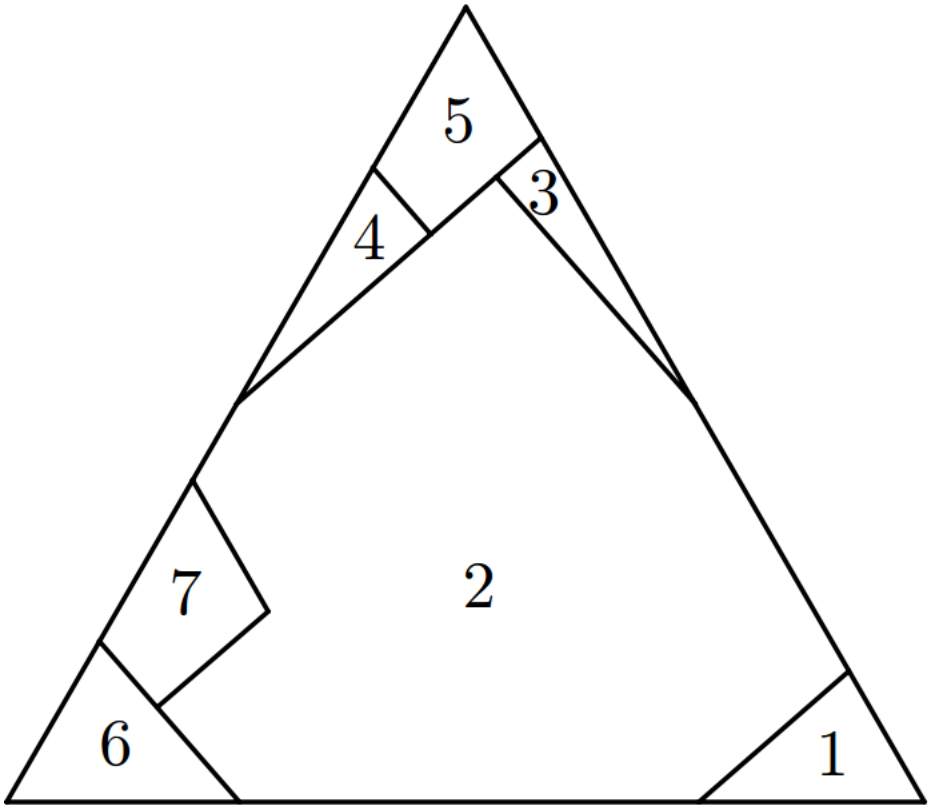


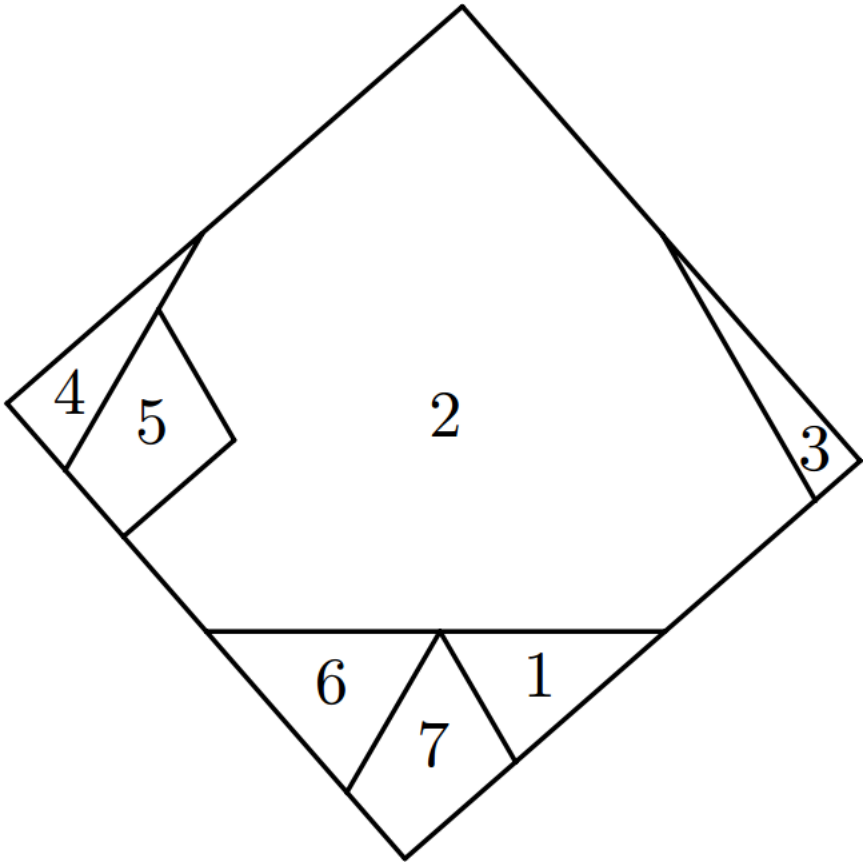
[Frederickson 2008]



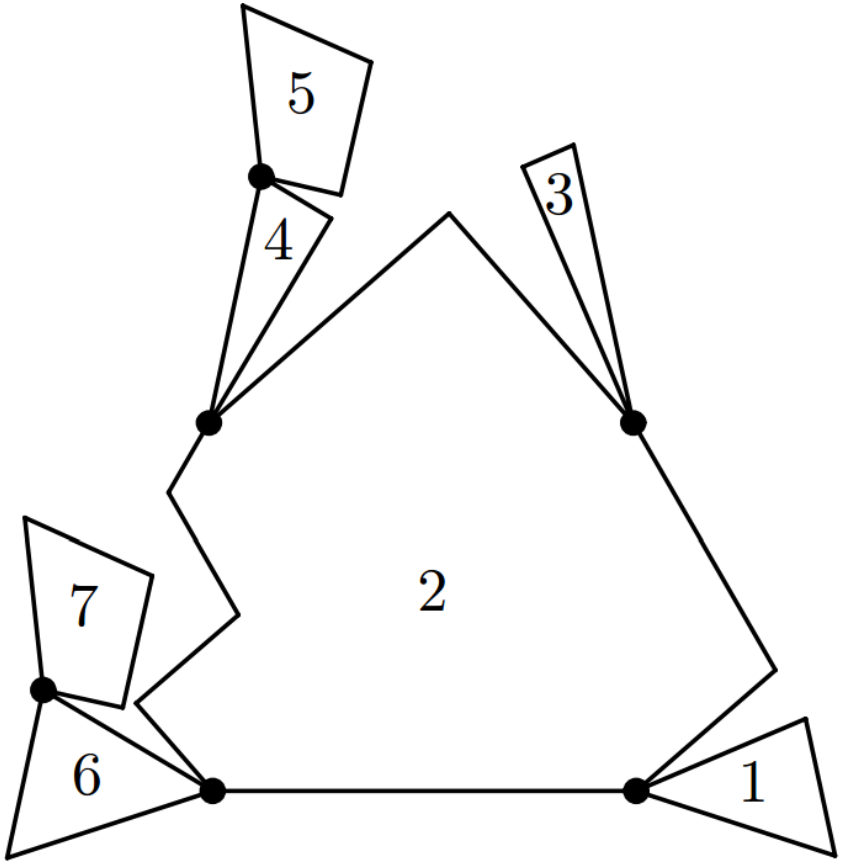


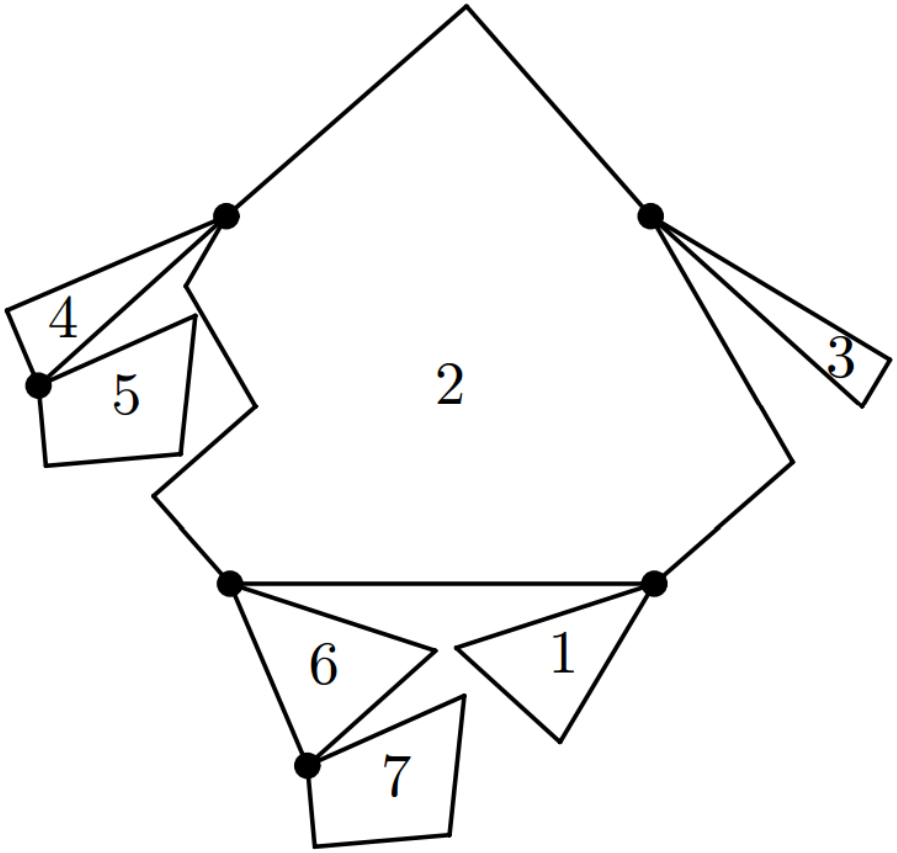
[Frederickson 2008]



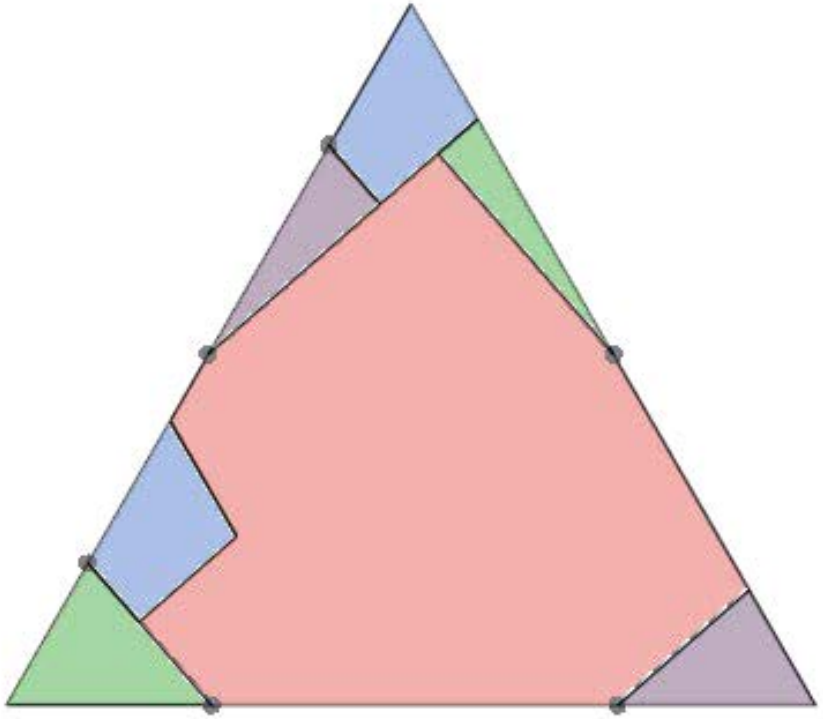


[Frederickson 2008]





[Frederickson 2008]

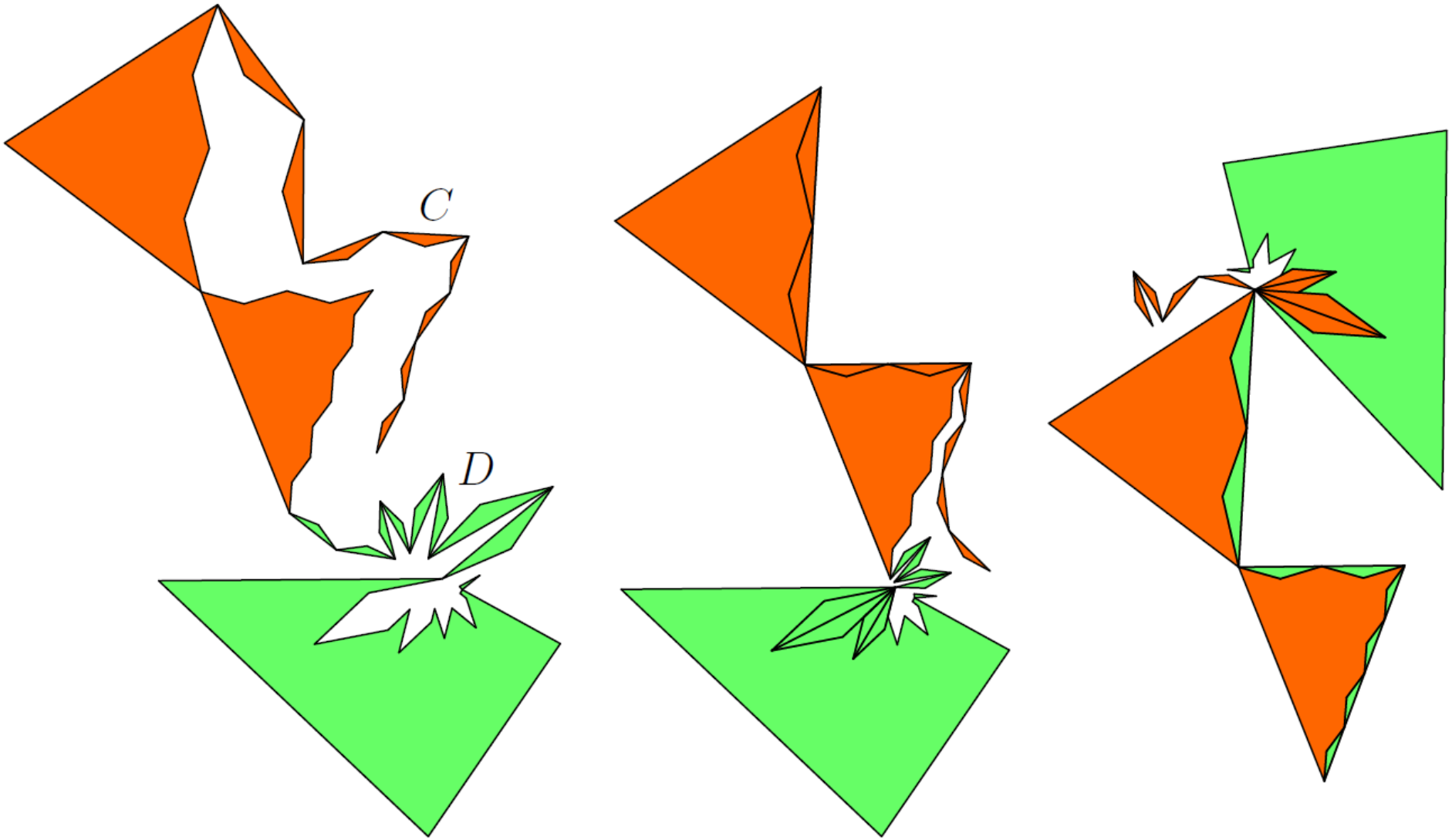


[Frederickson 2008]

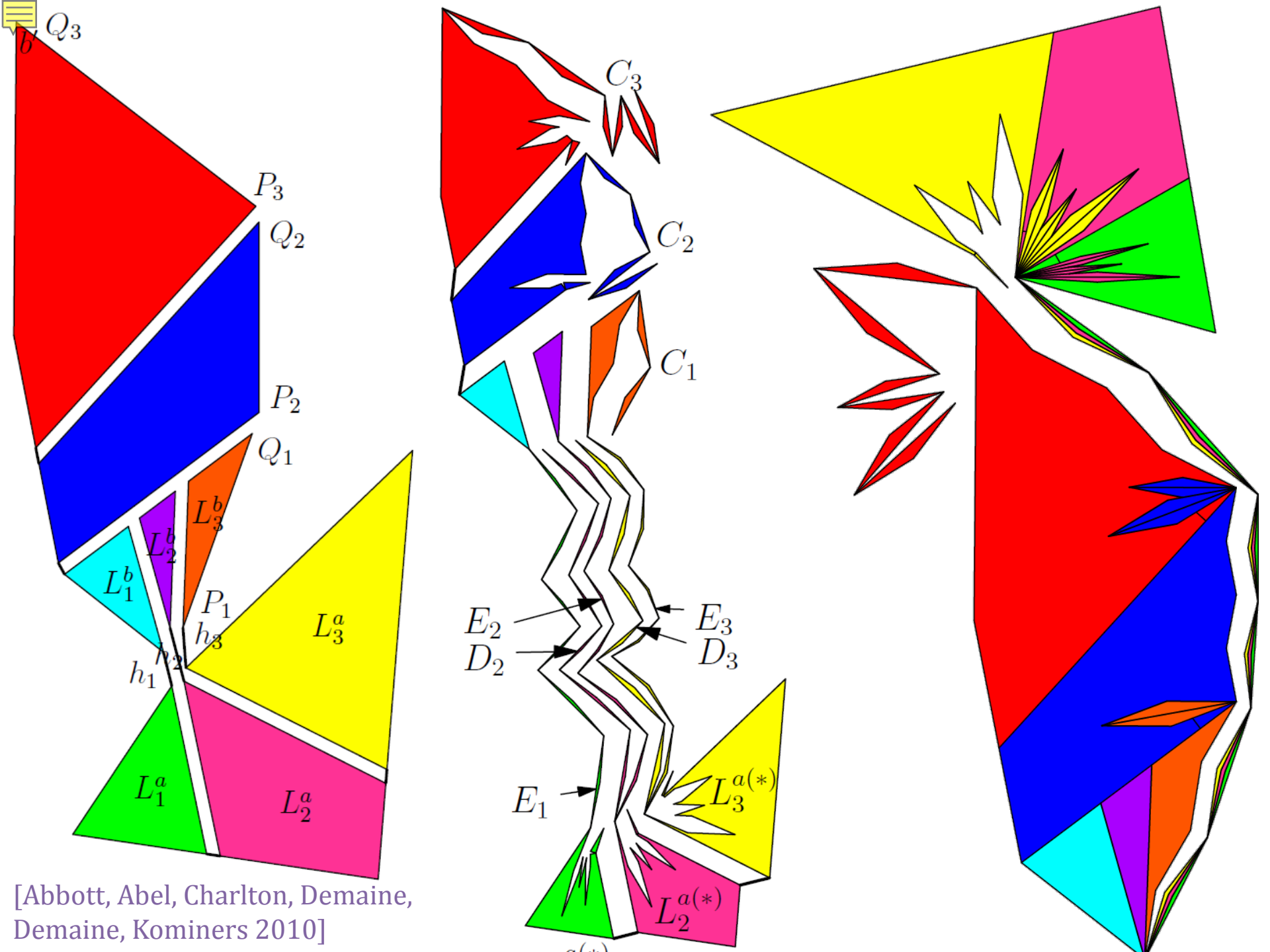
[D*Haus Company Ltd, 2012]

[D*Haus Company Ltd, 2011]

For step 3 of hinged dissections, you said that the number of pieces roughly doubles at each step, but from the diagrams it looks like the number of pieces would more than double.

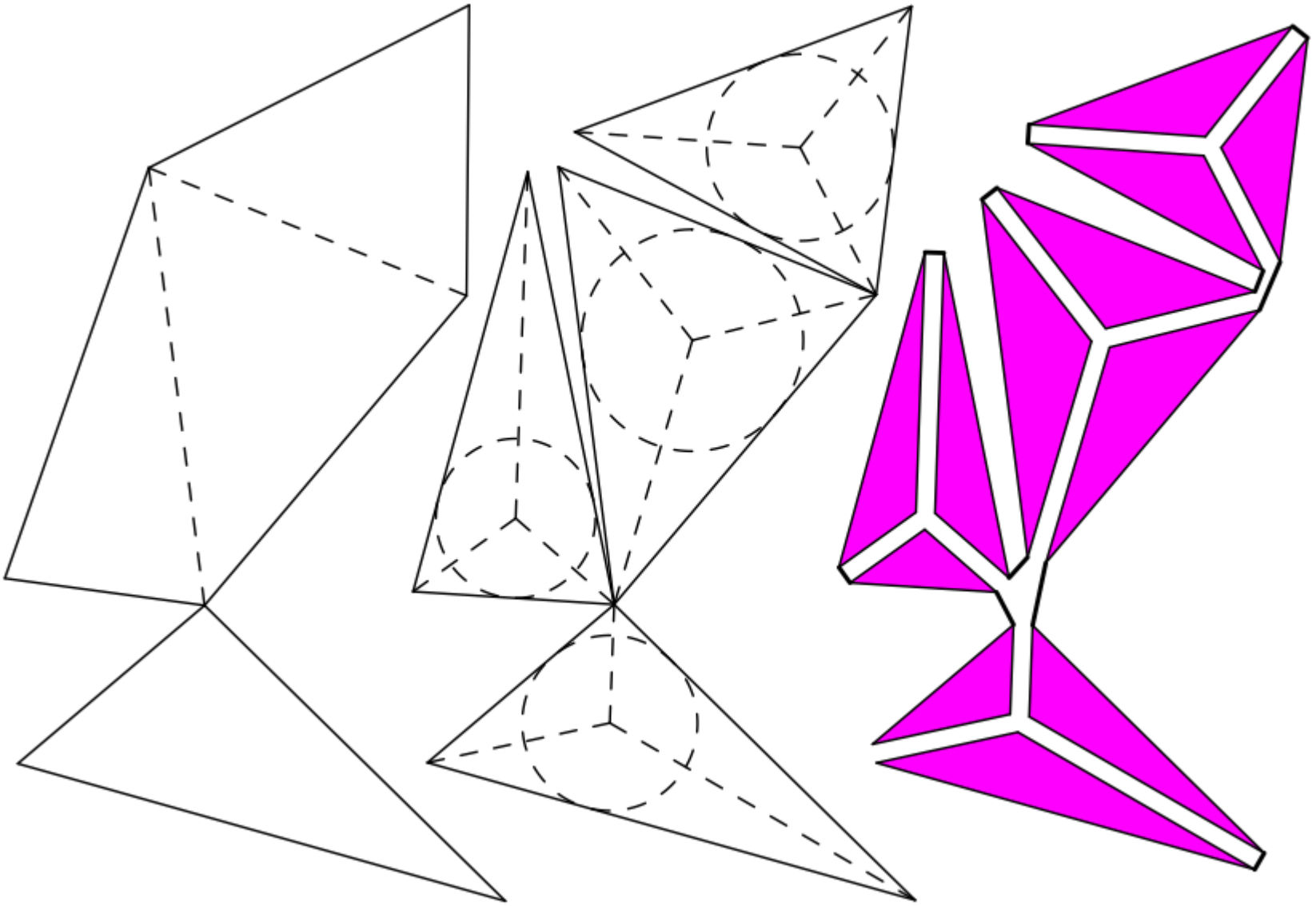


[Abbott, Abel, Charlton, Demaine, Demaine, Kominers 2010]

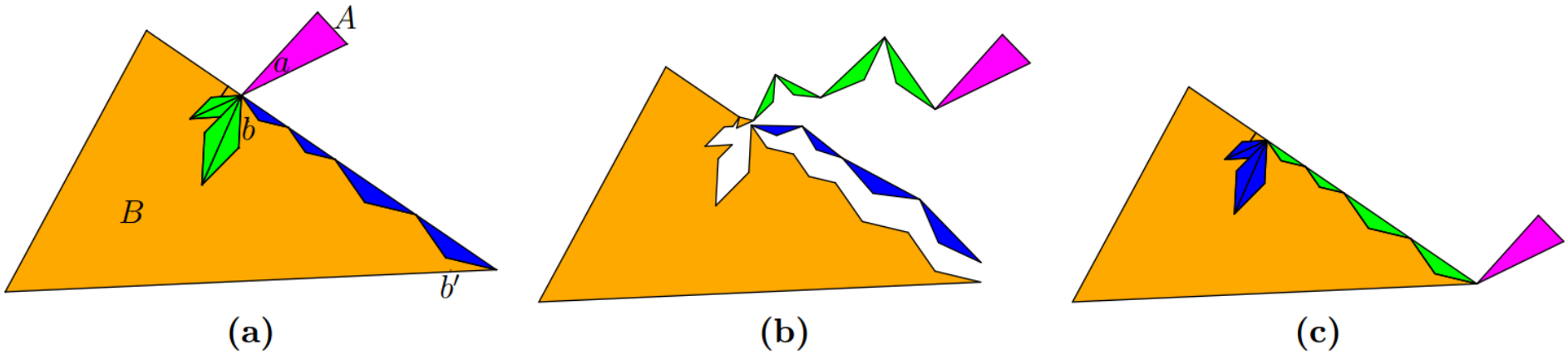


[Abbott, Abel, Charlton, Demaine, Demaine, Kominers 2010]

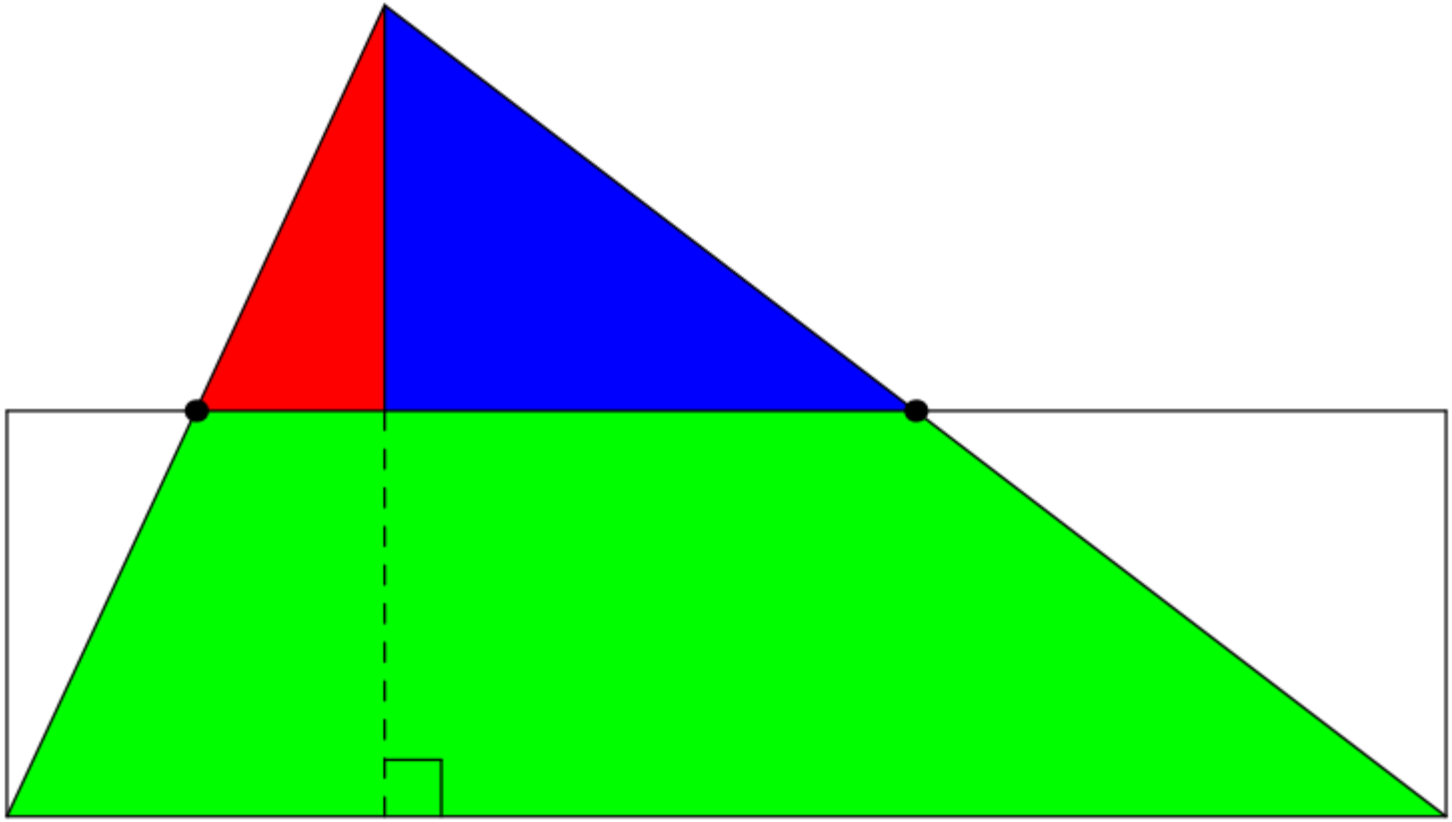
I’m curious about the pseudopolynomial bound for hinged dissection into a long rectangle, like you briefly mentioned.



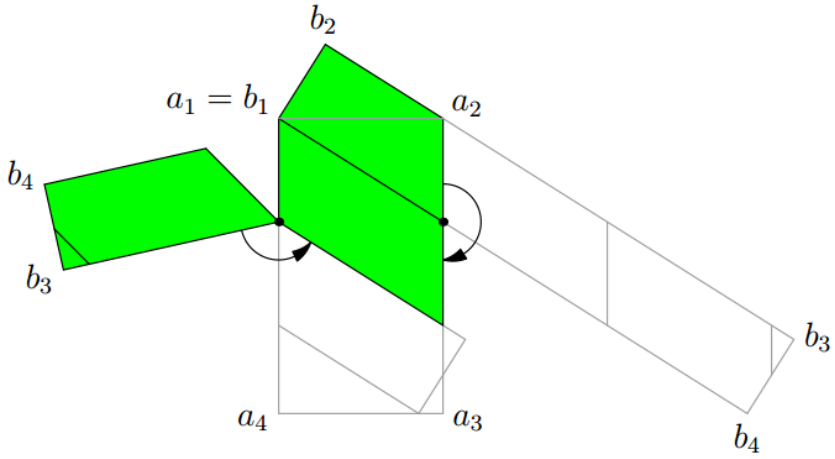
[Abbott, Abel, Charlton, Demaine, Demaine, Kominers 2010]



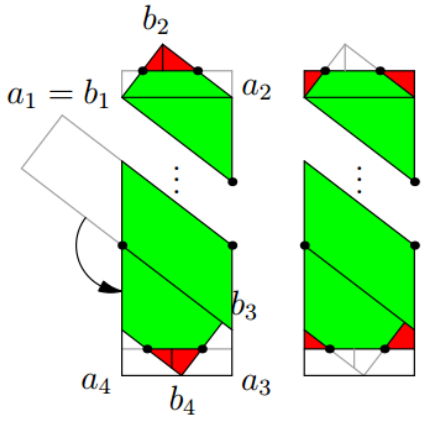
[Abbott, Abel, Charlton, Demaine, Demaine, Kominers 2010]



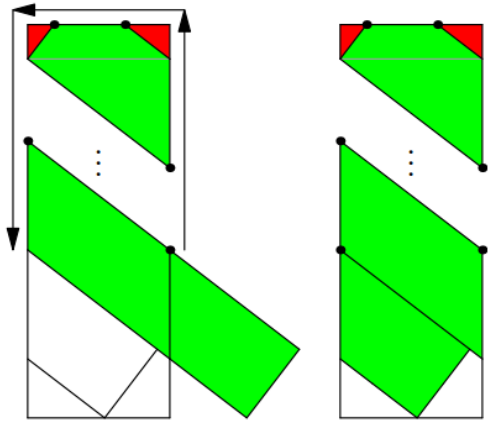
[Abbott, Abel, Charlton, Demaine, Demaine, Kominers 2010]



(a) Swinging B back and forth to cover A.

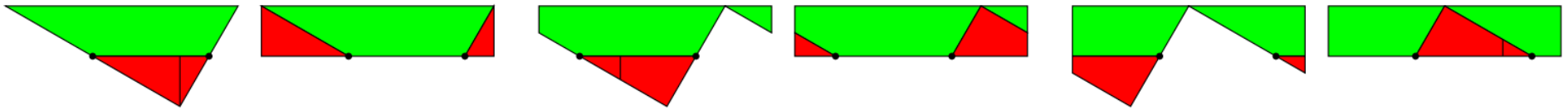


(b) Capping the top and bottom of B.



(c) Moving the end of B to "wrap around" A.

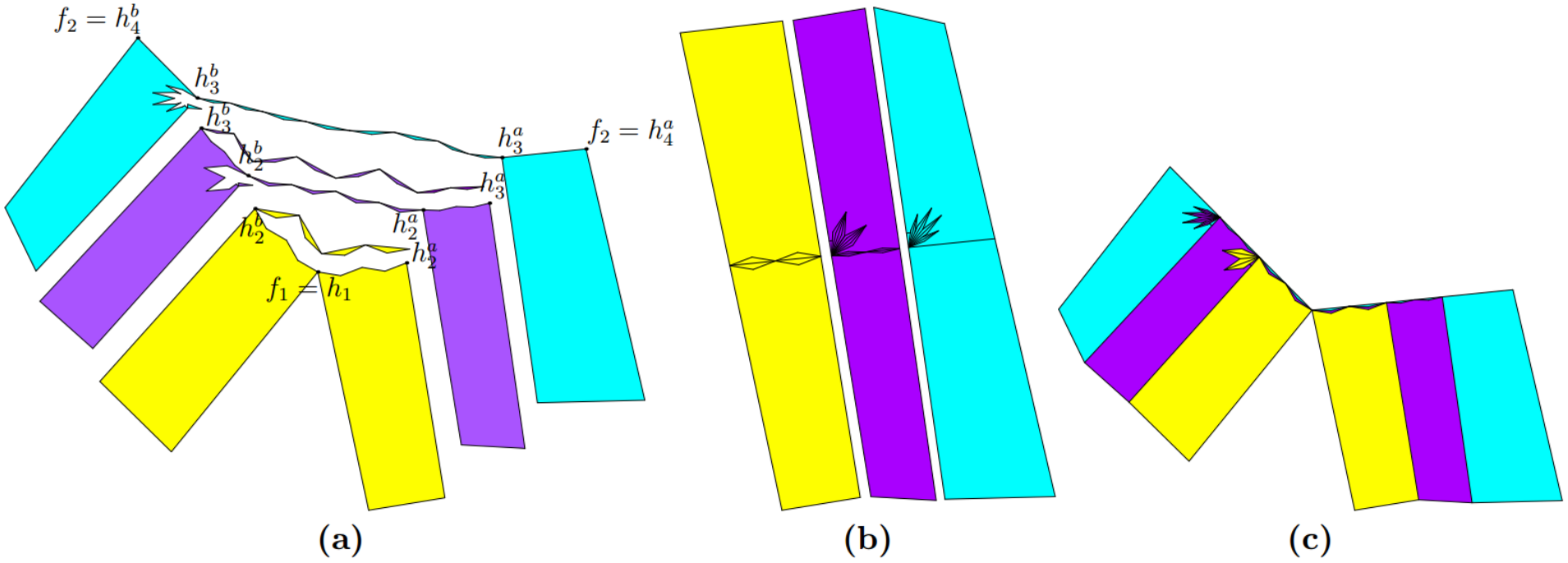
Figure 13: The stages of the rectangle-to-rectangle transformation.



(a) **(b)** **(c)**

Figure 14: The possible cases (up to reflection) when capping the rectangle base.

[Abbott, Abel, Charlton, Demaine, Demaine, Kominers 2010]



[Abbott, Abel, Charlton, Demaine, Demaine, Kominers 2010]

Can we get a brief overview of 3D dissections?

MATHEMATICAL PROBLEMS.*

LECTURE DELIVERED BEFORE THE INTERNATIONAL CONGRESS OF MATHEMATICIANS AT PARIS IN 1900.

BY PROFESSOR DAVID HILBERT.

3. The Equality of the Volumes of Two Tetrahedra of Equal Bases and Equal Altitudes.

In two letters to Gerling, Gauss * expresses his regret that certain theorems of solid geometry depend upon the method of exhaustion, *i. e.*, in modern phraseology, upon the axiom of continuity (or upon the axiom of Archimedes). Gauss mentions in particular the theorem of Euclid, that triangular pyramids of equal altitudes are to each other as their bases. Now the analogous problem in the plane has been solved.† Gerling also succeeded in proving the equality of volume of symmetrical polyhedra by dividing them into congruent parts. Nevertheless, it seems to me probable that a general proof of this kind for the theorem of Euclid just mentioned is impossible, and it should be our task to give a rigorous proof of its impossibility. This would be obtained, as soon as we succeeded in *specifying two tetrahedra of equal bases and equal altitudes which can in no way be split up into congruent tetrahedra, and which cannot be combined with congruent tetrahedra to form two polyhedra which themselves could be split up into congruent tetrahedra.*‡

[Hilbert 1900]