

Three-Dimensional DNA Origami



William Shih, Ph.D.

Dana-Farber Cancer Institute

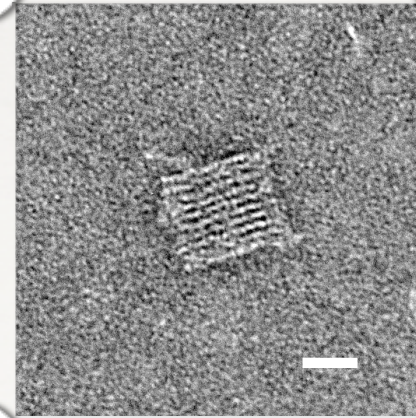
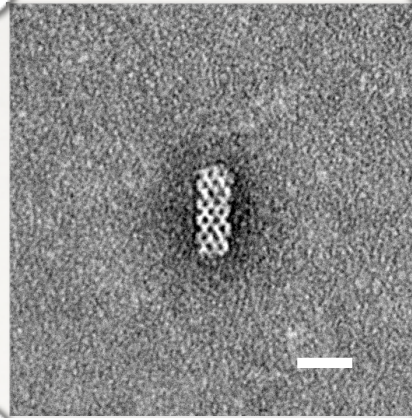
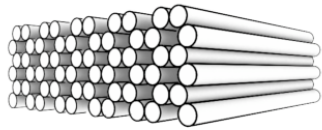
Wyss Institute for
Biologically Inspired Engineering

Harvard Medical School

2009 April 8

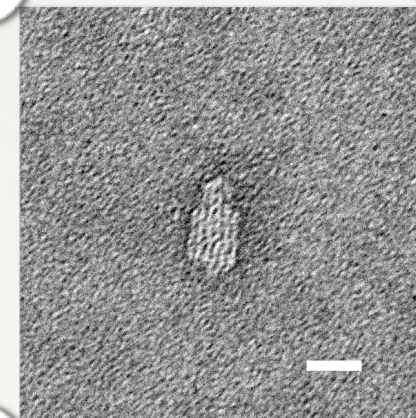
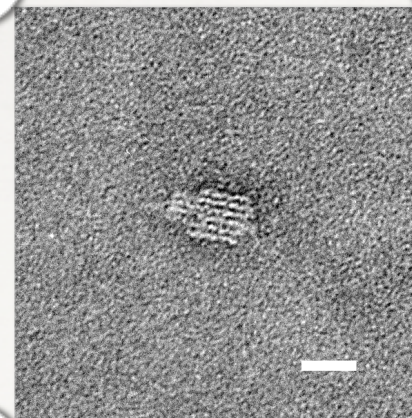
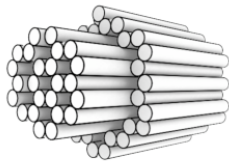
“Monolith”

Shawn Douglas



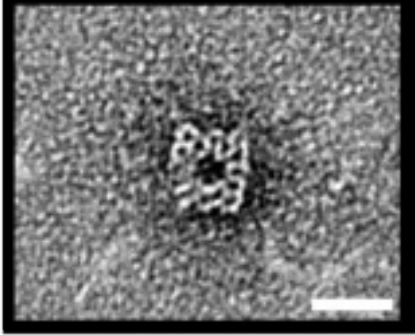
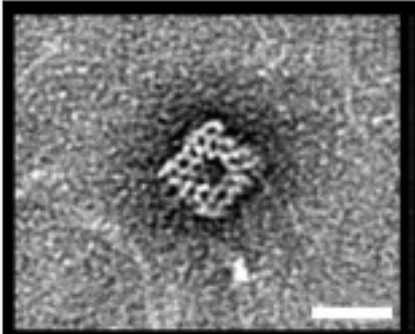
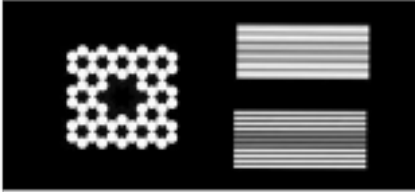
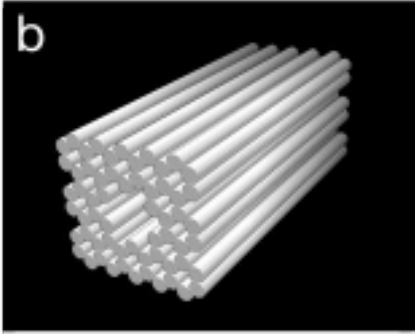
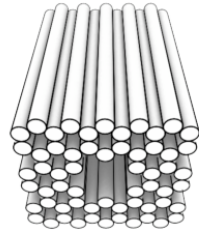
“Genie Bottle”

Franziska Graf



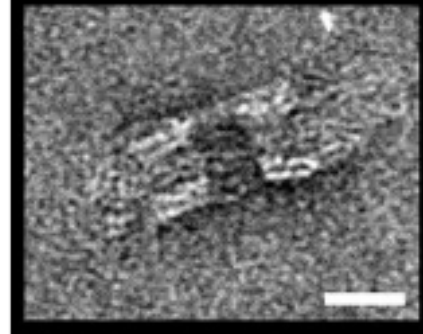
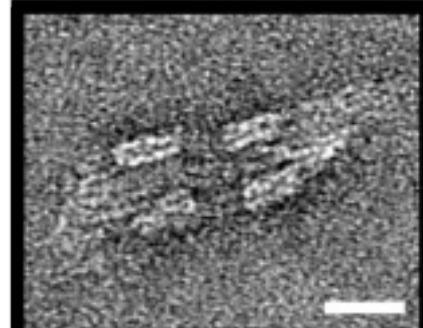
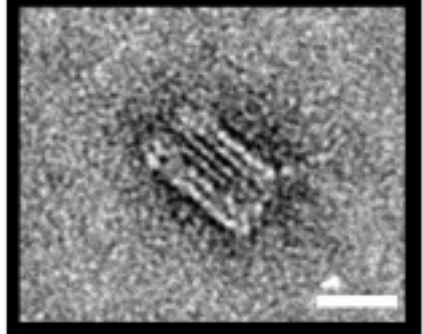
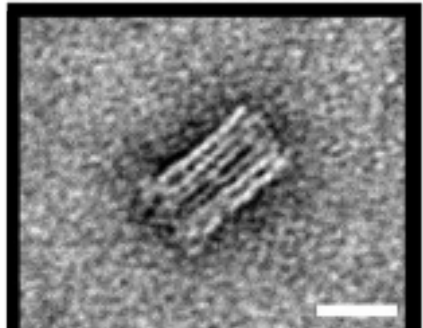
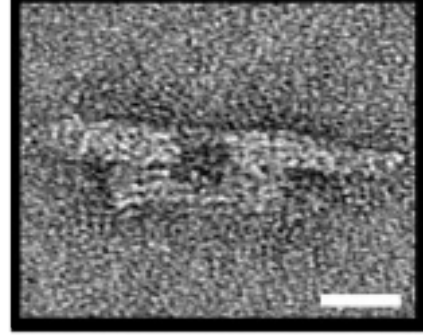
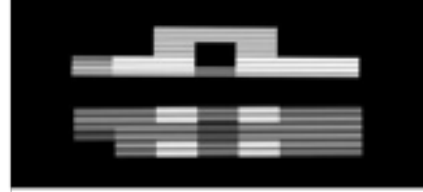
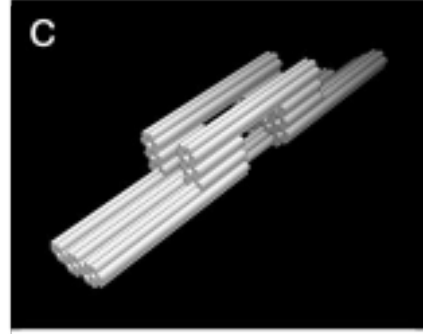
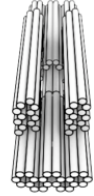
“Square Nut”

Shawn Douglas



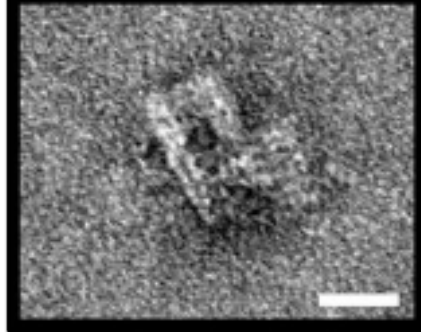
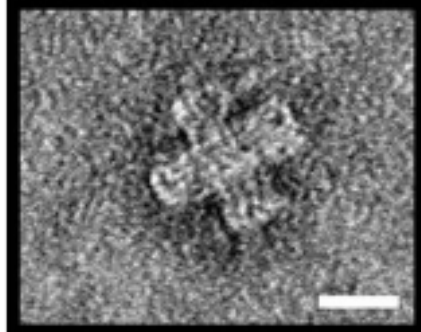
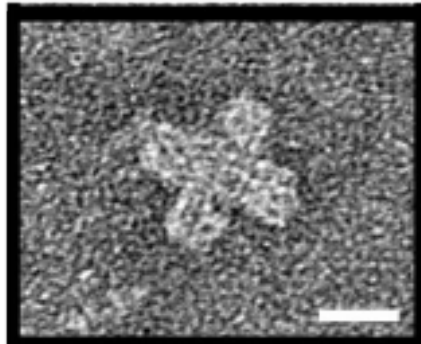
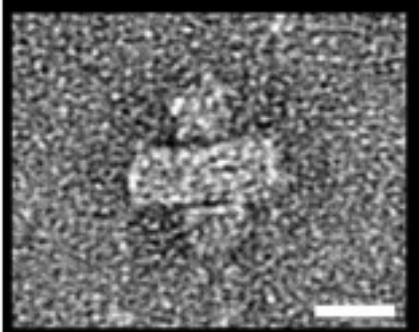
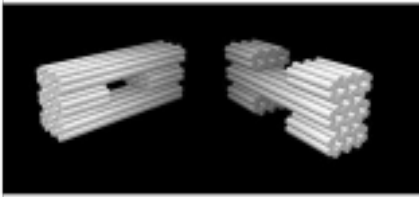
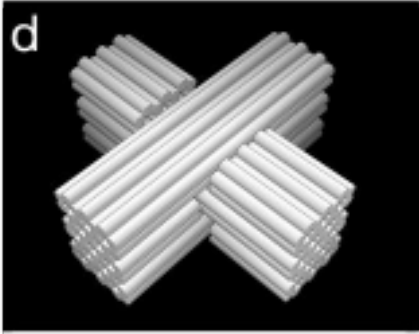
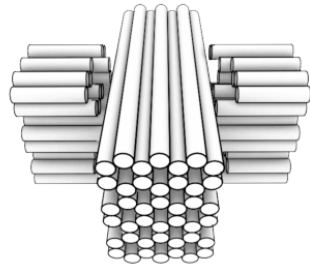
“Railed Bridge”

Tim Liedl



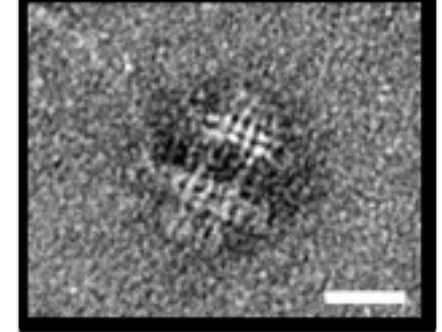
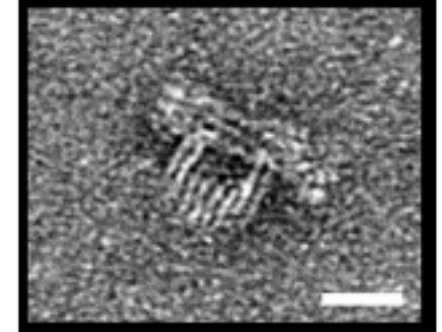
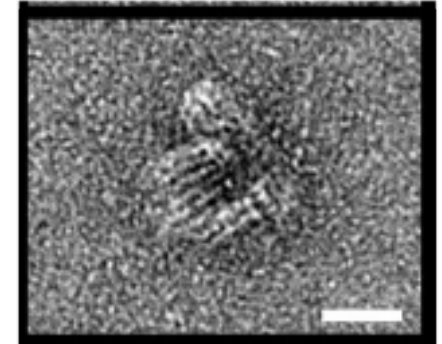
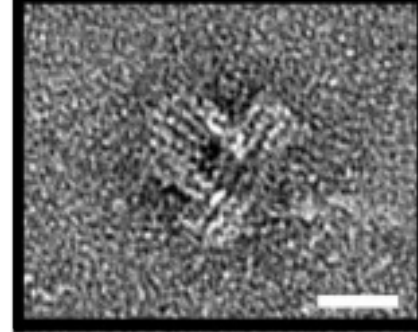
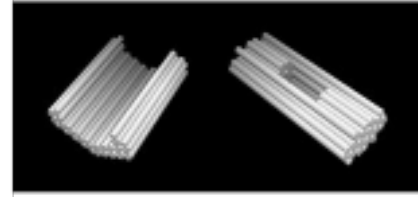
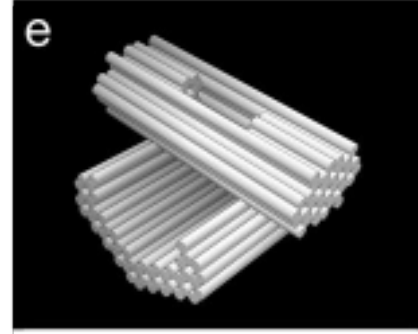
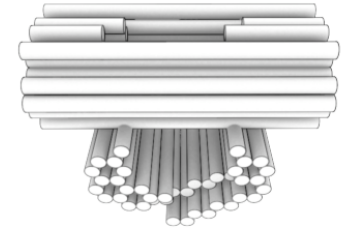
“Slotted Cross”

Björn Högberg



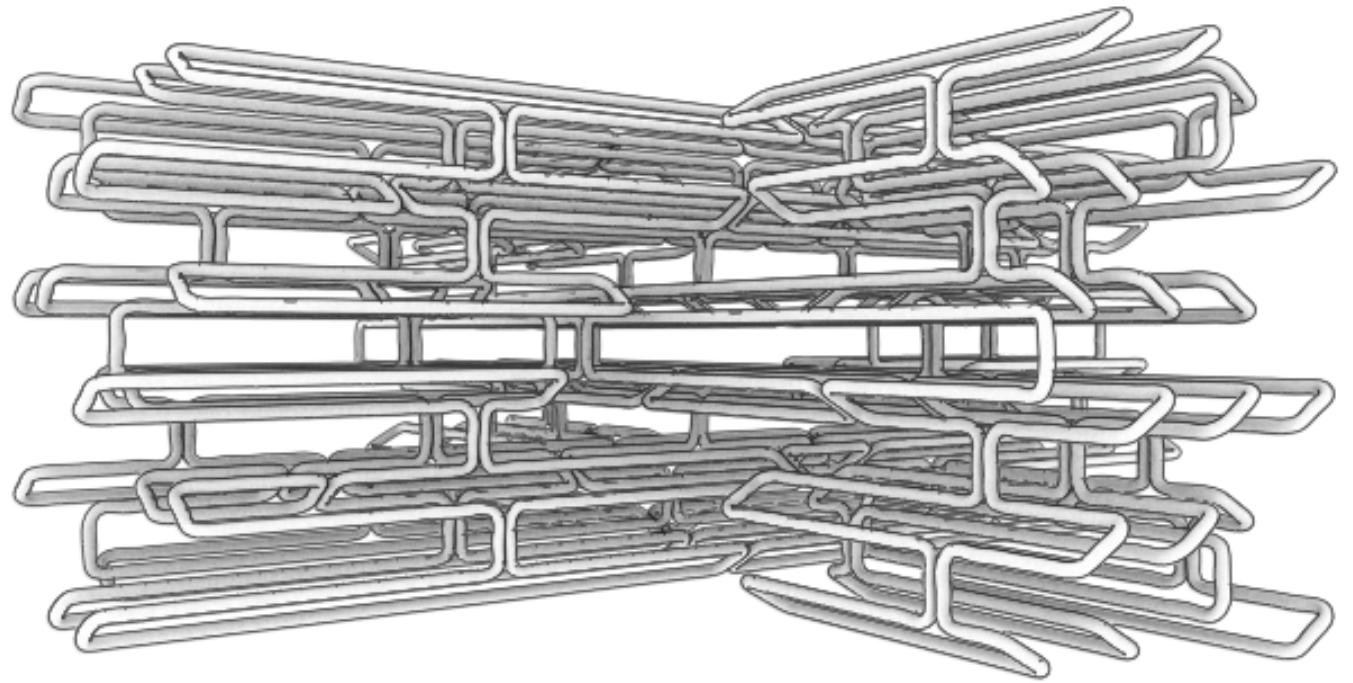
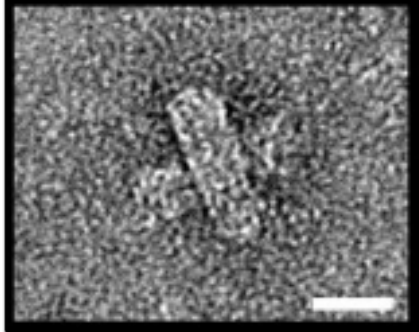
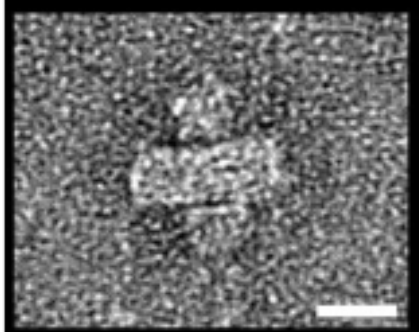
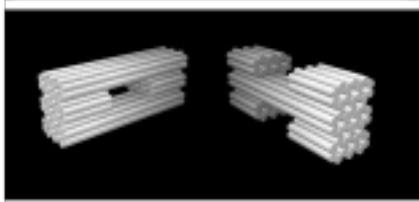
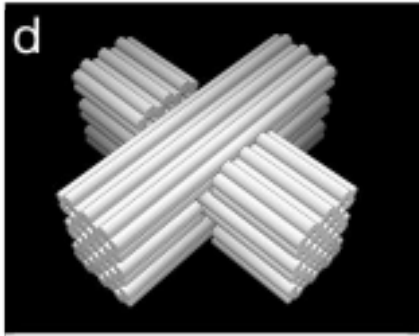
“Stacked Cross”

Hendrik Dietz



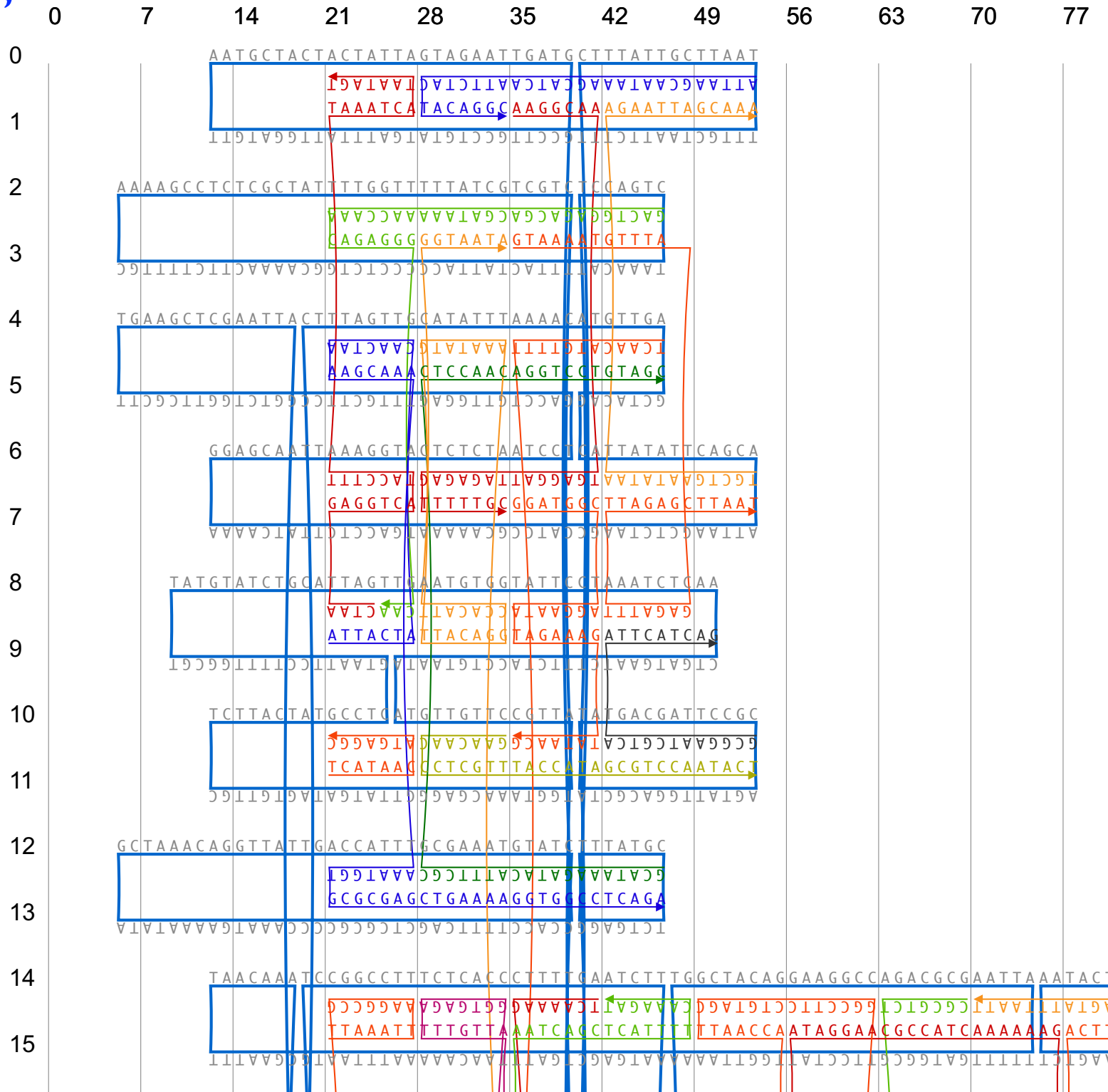
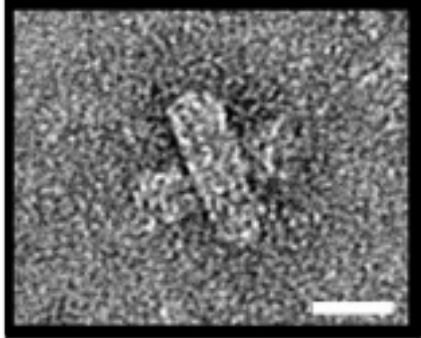
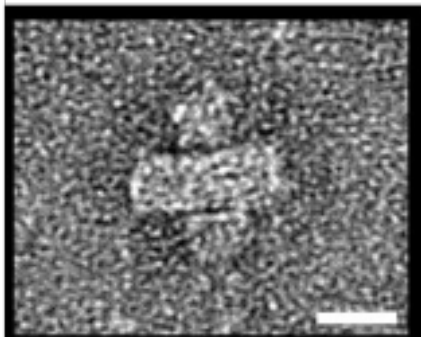
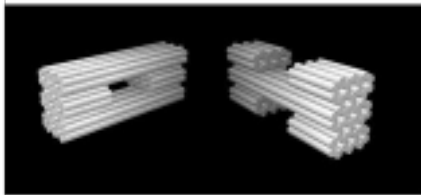
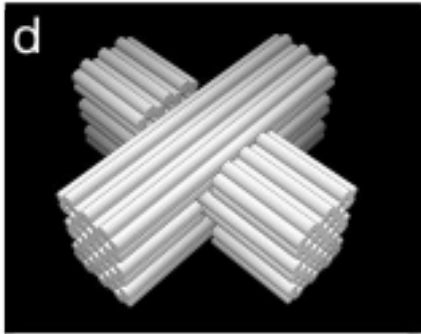
“Slotted Cross”

Björn Högberg



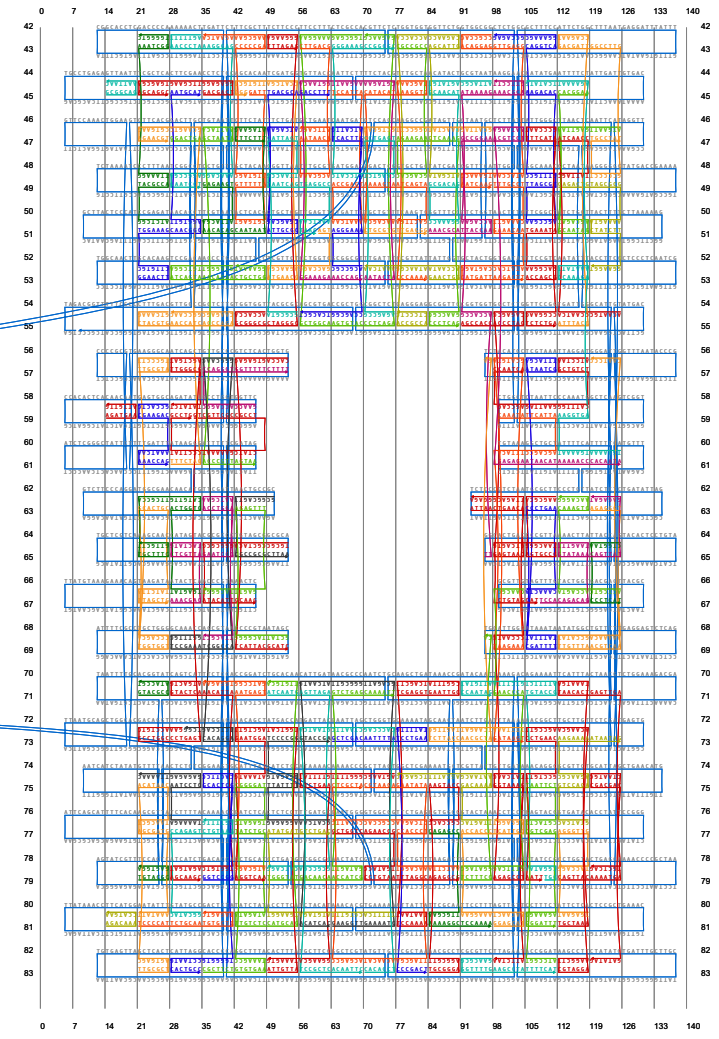
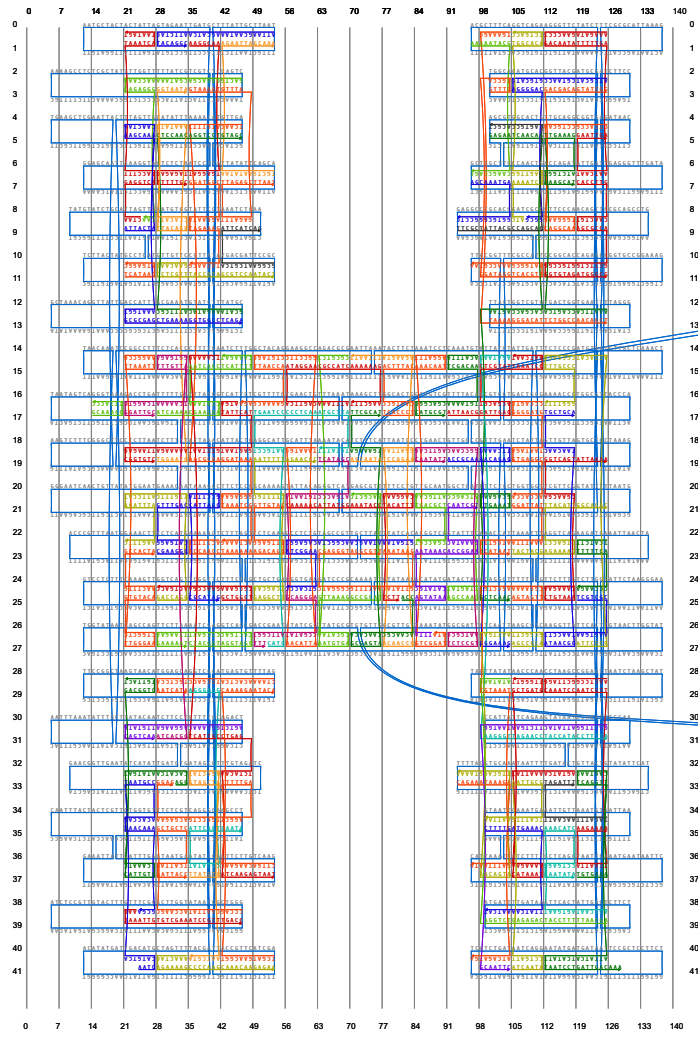
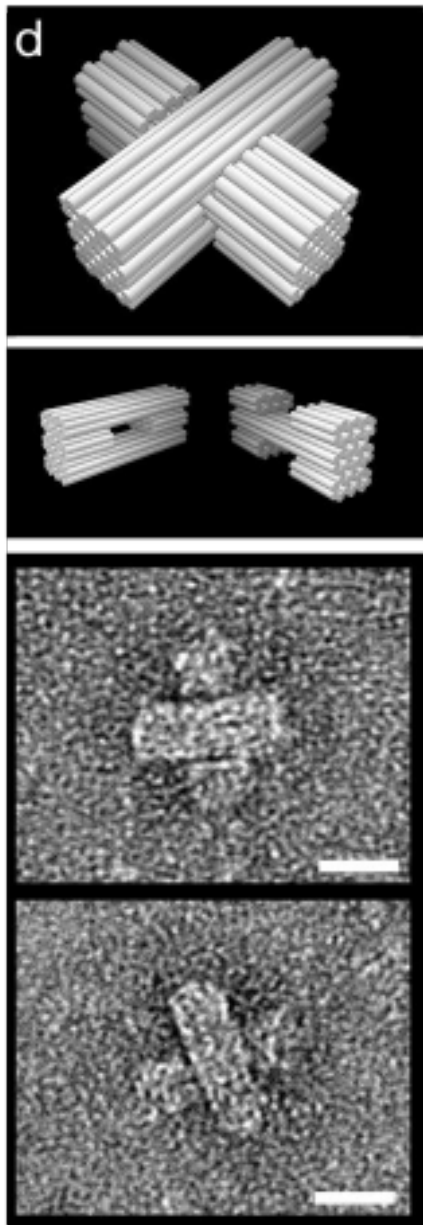
"Slotted Cross"

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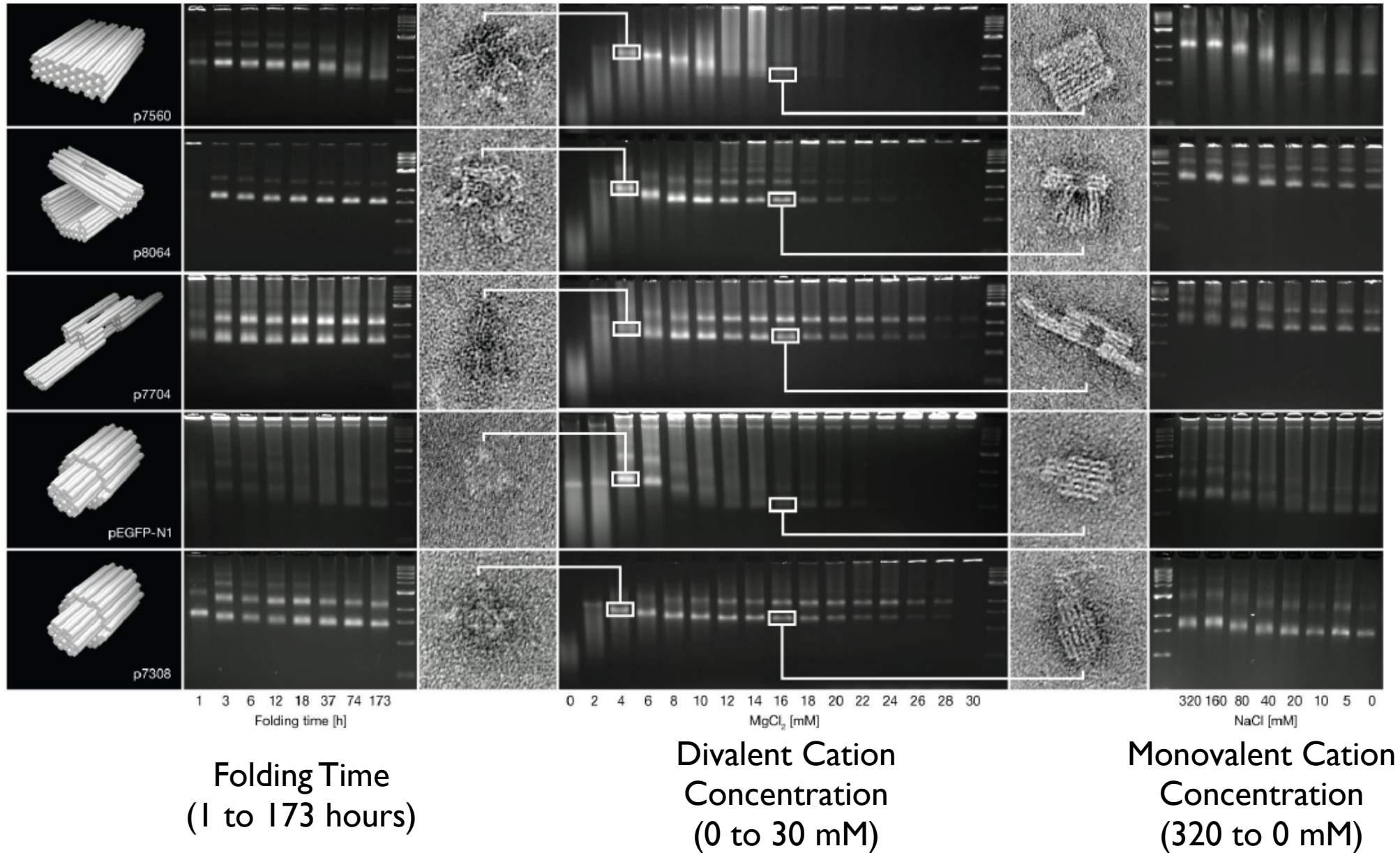


“Slotted Cross”

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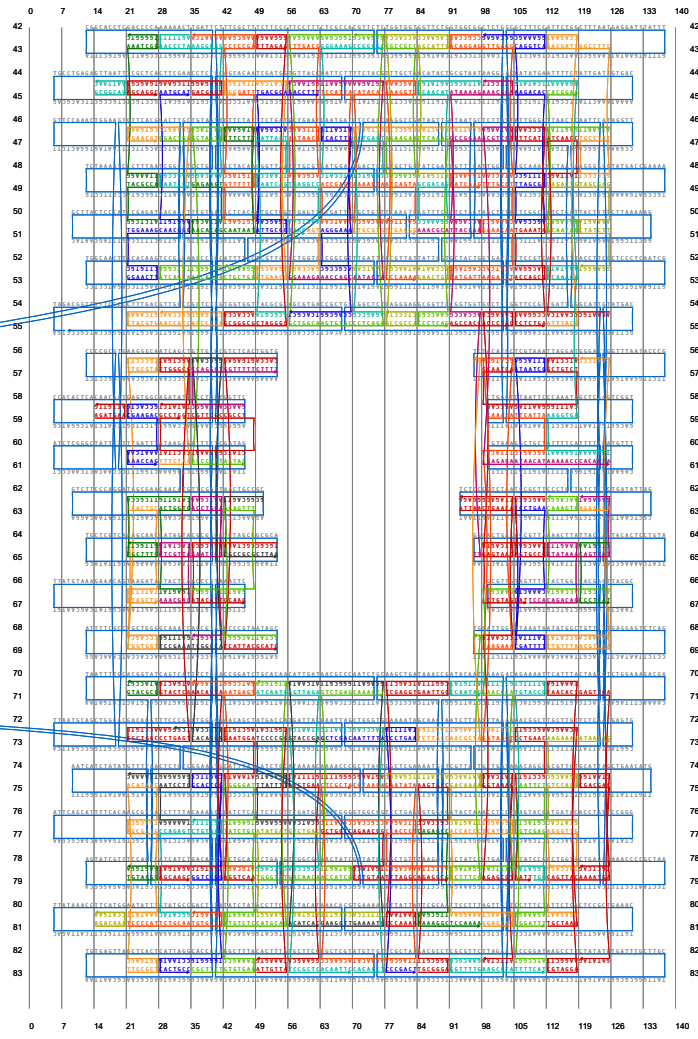
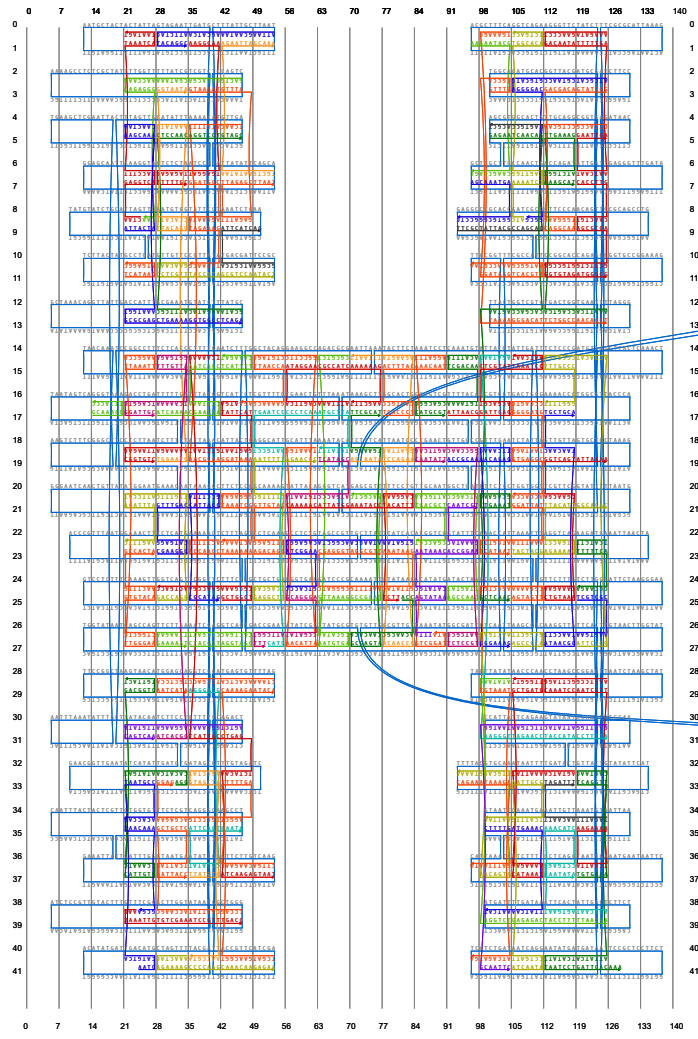
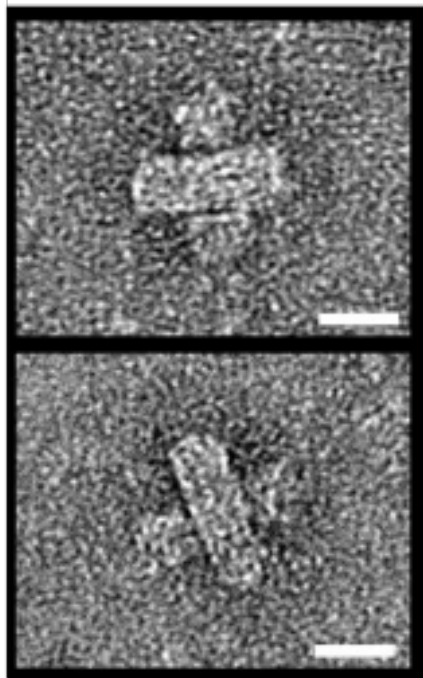
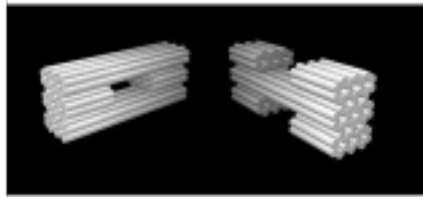
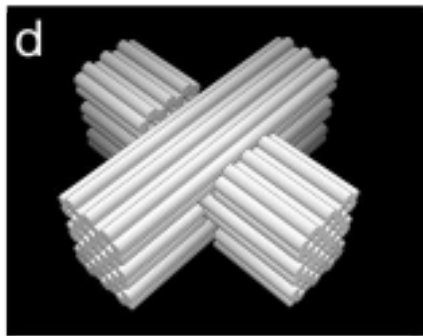
Three Environmental Determinants of Successful Folding



Douglas SM, Dietz H, Liedl T, Högberg B, Graf F, Shih WM, *Nature* in press 2009.

“Slotted Cross”

Björn Högberg



Design challenges

Steep learning curve

Ad hoc methods are tedious and error prone

New shapes can require days or weeks of effort



caDNAno

open-source software for design of
three-dimensional DNA origami

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1. Download & Install



ADOBE AIR™

2. Get caDNAno



what is caDNAno?

caDNAno is software for design of three-dimensional DNA origami nanostructures. It was written with the goal of providing a simple and user-friendly interface to facilitate a process that can be complex and error-prone.

caDNAno features:

- No programming required
- Integrated 2D and 3D interfaces
- Visual cues to aid design process
- Export formats: [SVG](#), [X3D](#), [JSON](#)
- Platform independent
- Open source (MIT license)

Featured design



slotted cross

[view full gallery](#)

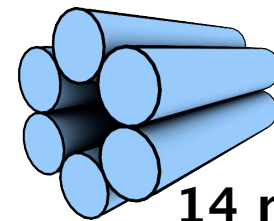
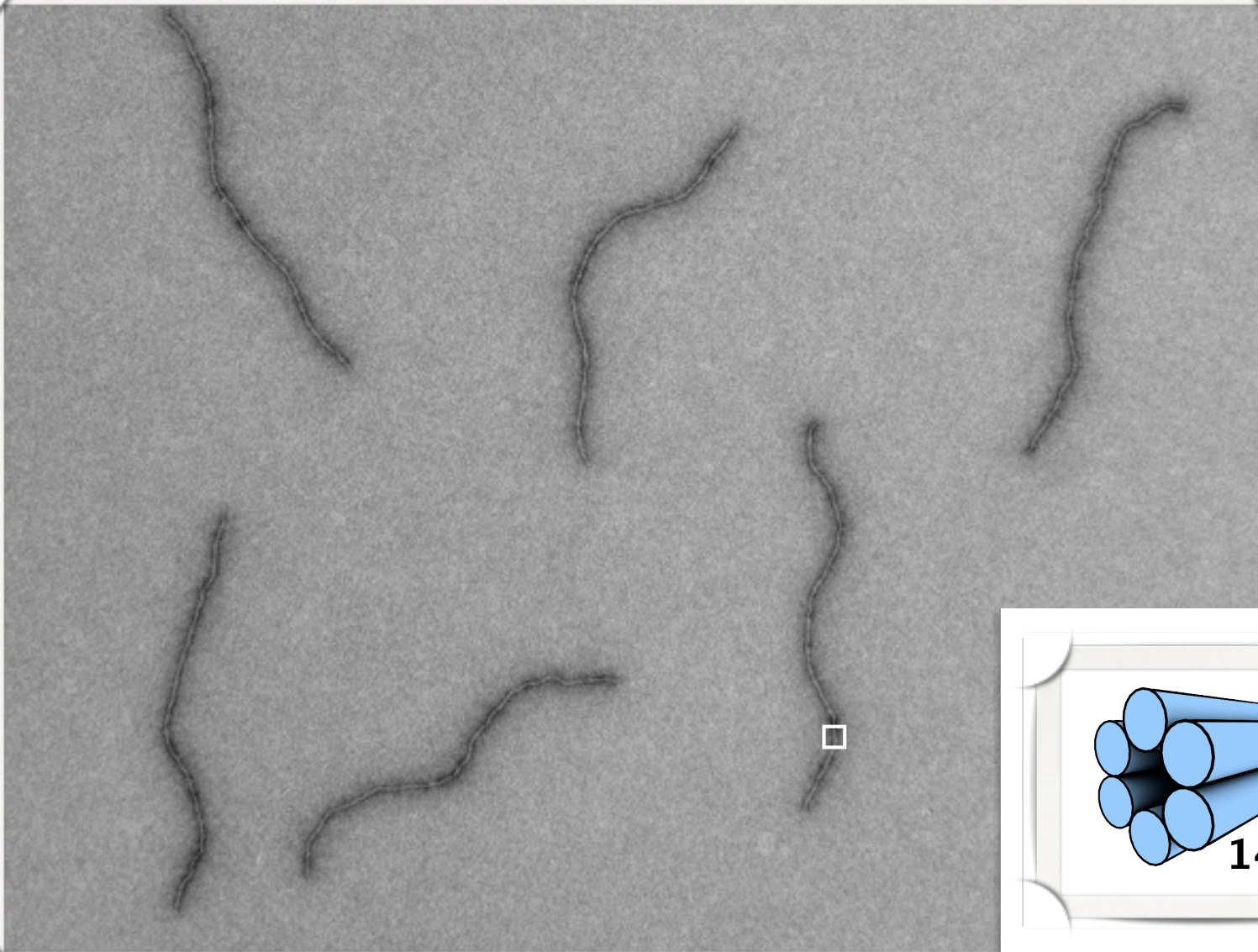
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[Shih Lab](#)

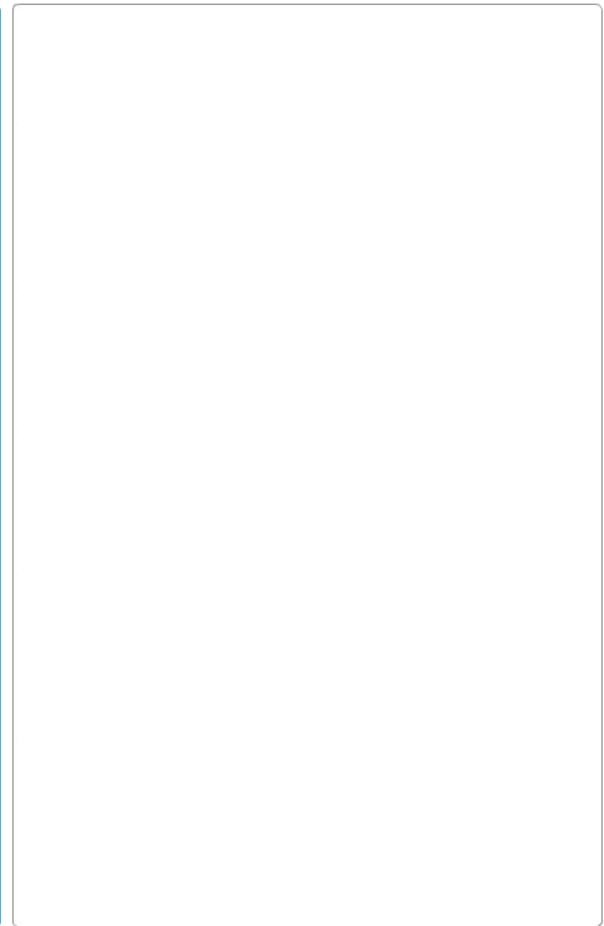
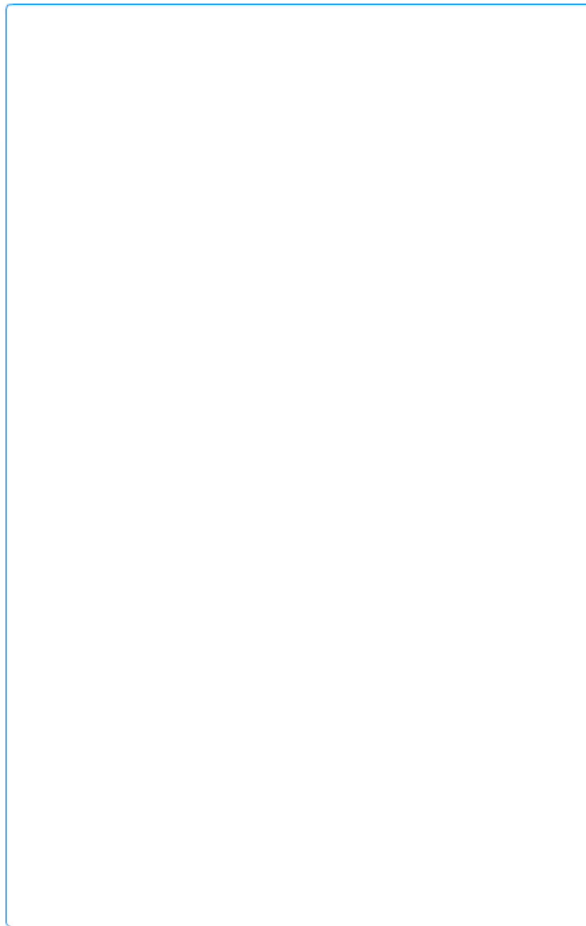
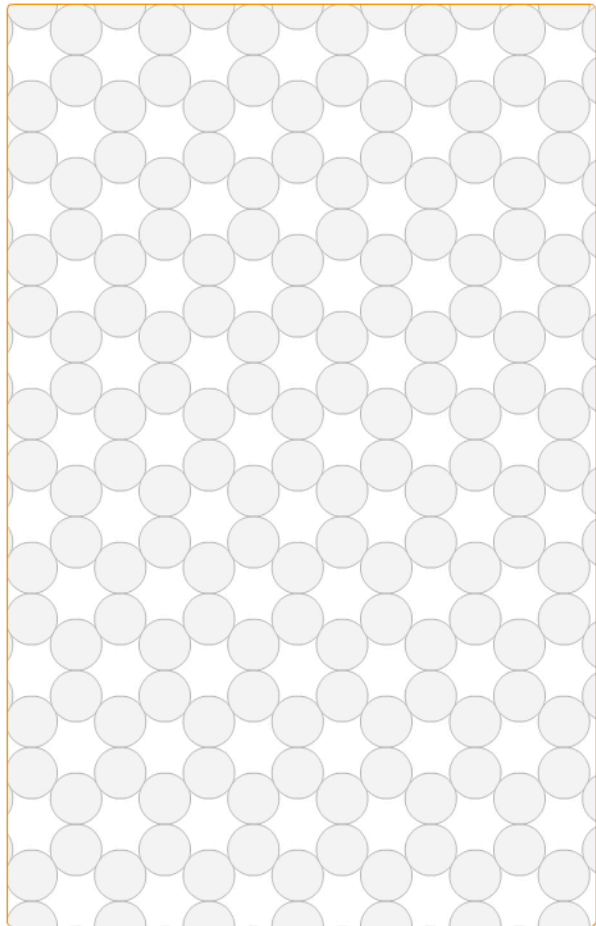
[Church Lab](#)

<http://cadnano.org/>

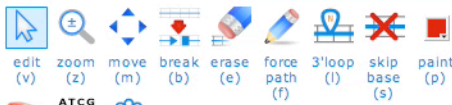
Douglas SM, Marblestone AM, Teerapittayanon S, Vazquez A, Church GM, Shih WM. *Nucleic Acids Res.* Accepted, 2009.



14 nm



edit zoom move first prev next last



edit (v) zoom (z) move (m) break (b) erase (e) force path (f) 3'loop (l) skip base (s) paint (p)



auto staple add seq export



zoom move export



open save save as use server



DOCK

