



# Unfolded

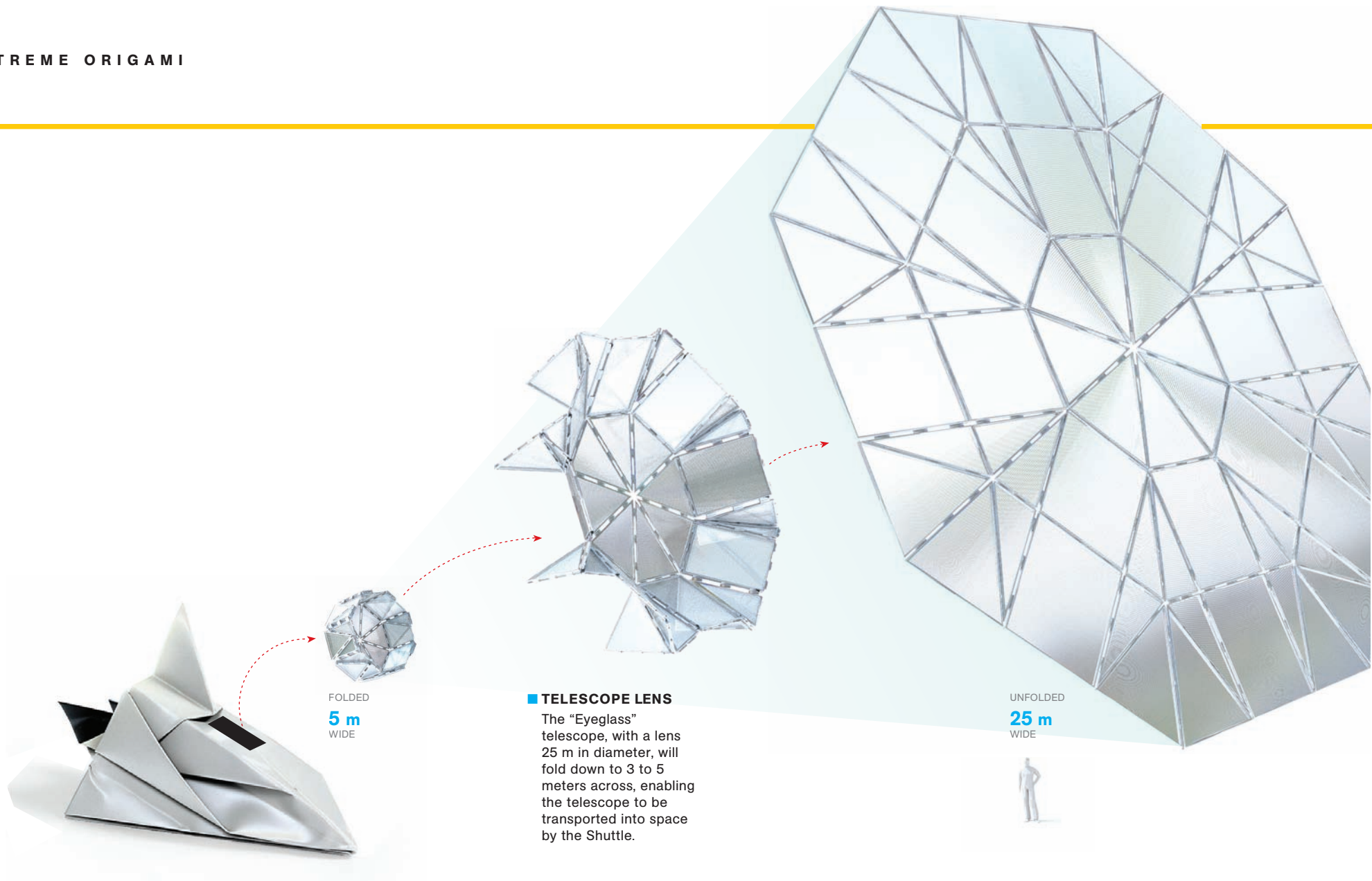
From telescopes to heart surgery, technology is increasingly relying on the ancient art of origami.

Art by Bryan Christie Design  
Origami by Robert J. Lang

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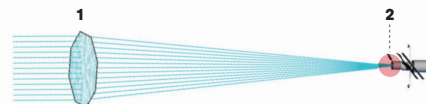


## TELESCOPE LENS

The "Eyeglass" telescope, with a lens 25 m in diameter, will fold down to 3 to 5 meters across, enabling the telescope to be transported into space by the Shuttle.



The Eyeglass telescope would consist of two spacecraft: a 25-meter-aperture Magnifying Glass (1) gathers and focuses light to a spot about 1 kilometer away, where the light is collected by a 1-meter aperture mobile Eyepiece (2).



## HEART STENT

Faulty heart valves will be replaced by folding a new valve and stent to a width of about 7 mm - small enough to be inserted via catheter into the femoral artery, and then unfolding it at its destination

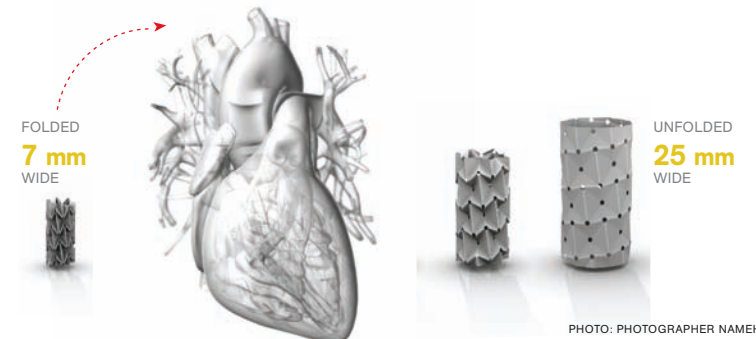
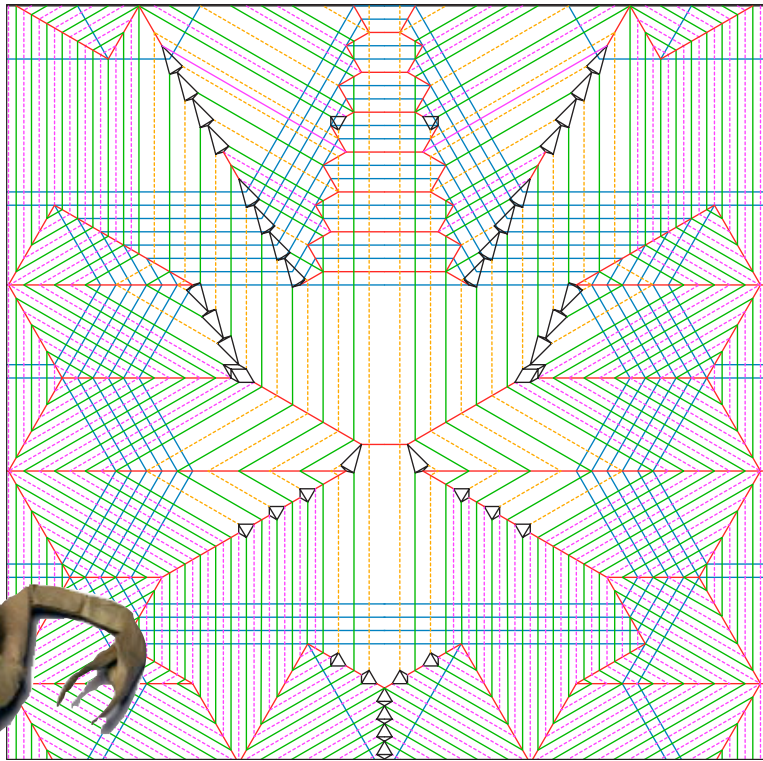


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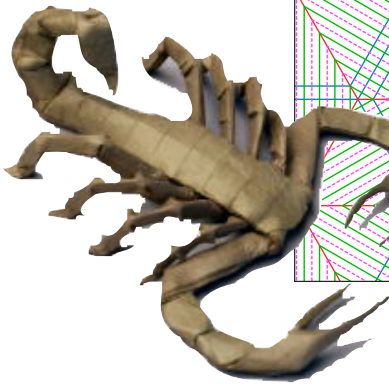
## CREASE PATTERNS

Four simple laws govern the art of origami.

- 1 Folds can be colored with just two colors.
- 2 At each vertex, the number of mountain folds and the number of valley folds always differs by two.
- 3 If you number the angles around a vertex, all the even angles add up to a straight line. Same for the odd angles.
- 4 A sheet can never penetrate a fold.



This is the crease pattern for the Robert Lang's scorpion. Red lines indicate something. Blue lines indicate mountain folds.



volcanoes already do it. After Mount Pinatubo erupted in the Philippines in 1991, launching ten million tons of sulfate particles into the stratosphere and spreading a sun-dimming haze around the planet, the average temperature dropped by about a degree Fahrenheit for a year. With carefully designed particles, geoengineers might make do with a fraction of that tonnage—though because they fall out of the stratosphere, the particles would have to be delivered continually, year after year. Still, says Caldeira, the sulfate scheme would be “essentially free compared with the other costs of mitigating climate change.”

Not so the idea suggested by Roger Angel, an eminent astronomer and telescope designer at the University of Arizona. Angel has proposed launching trillions of two-foot-wide, thinner-than-Kleenex disks of silicon nitride—each disk an autonomous robot weighing less than a gram—into

space between Earth and the sun, where they could deflect sunlight. By Angel's own reckoning, the scheme would take decades and cost trillions of dollars. With that much time and money, the climate accident would become a train wreck: The global warming we'd been masking would come rushing at us all at make do with a fraction of that tonnage—though because they fall out of the stratosphere, the particles would have to be delivered continually, year after year. Still, says Caldeira once. That might be the worst unintended consequence of geoengineering, but there would be others—damage to the ozone layer, perhaps, or an increase in drought. Proponer—but if CO<sub>2</sub> keeps rising and the ice keeps melting, what once seemed insane hubris just might become reality. —Rob Kunzig

➔ **Good or bad idea?** Discuss online at [ngm.com](http://ngm.com).