“Unfolding” exhibit blends art and science at the Broad

By Ellen Clegg
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CAMBRIDGE (Dec. 14, 2011) – This Thursday, the Broad begins “Unfolding.” That’s the title of an exhibition featuring the work that artist-in-residence Guhapriya Ranganathan has created during her two-year collaboration with scientists here. Ranganathan, known as Gupi, will present a video and talk about her work at 4 p.m. on Thursday, December 15, in the Auditorium at 7CC. Joining her in a discussion about the intersection of art and science will be Erez Lieberman Aiden, fellow collaborator and Broad researcher.

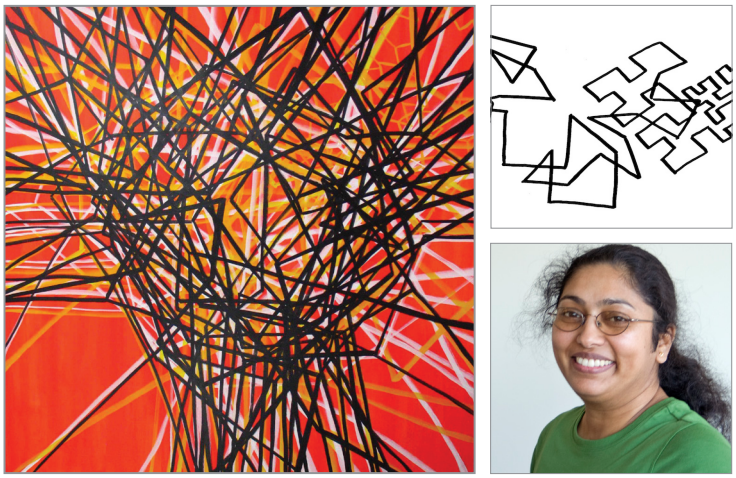
In “Unfolding,” which encompasses video, paintings, prints, and wire sculpture, Gupi explores the process of the genome unfolding and links it seamlessly to the process of scientific collaboration at the Broad.

That’s what the artist-in-residence program is designed for: to stimulate collaborative problem-solving with an interdisciplinary approach. Together, artists and Broad scientists explore issues of visual representation, and the communication of ideas toward a greater understanding of the complexities of the genomic landscape. In her work at the Broad, Gupi collaborated with scientists across disciplines and platforms: Erez Lieberman Aiden; Catherine Luce of the Stanley Center for Psychiatric Research; Dawn Thompson, a research scientist working in core member Aviv Regev’s lab; research scientist Elinor Karlsson; and senior computational biologist Sarah Calvo.

The artworks, which will be on display through March 15, 2012, in all four Broad buildings, represent science in all its effortless beauty: the image of a long polymer folded into a fractal globule, lines seen in neural structures, space-filling lines based on the Hilbert curve.

“This is not just about the genome unfolding, but about the work, the ideas unfolding at the Broad,” Gupi says. “‘Unfolding’ also means making something apparent and clearer.” She collaborated closely with Erez, who discovered how the two-meter-long human genome folds itself inside an infinitesimal space without tangling. Erez’s work, which he began as a student in the lab of Broad director Eric Lander, led to a paper published in *Science* in October 2009, Erez’s 2010 doctoral dissertation at Harvard and MIT, as well as the GE & *Science* prize for Young Life Scientists, awarded earlier this month.

“Erez started off by showing me his paper on the fractal globule and the genome,” Gupi says. “What struck me immediately is that it is a line. In artistic terms, it has line, area, and volume — it takes on a form and shape of its own. I took it home and made a model of it in order to better understand what it meant in visual terms. This pattern became clear in our talks together — when we came across a problem, he would speak about it in mathematical terms and I would be solving the same problem in visual terms.”



Synthesis III (2011), excerpt from 120 Drawings, Gupi Ranganathan

Erez enjoyed the collaboration. “I really enjoyed learning from Gupi’s creative process, and especially her tendency to do serial visual experimentation: trying a huge number of variants on a single image till she found something that worked,” he says. “This helped inspire my group to explore mathematical variants on the curves we use to help model the genome that we may not have otherwise emphasized.”

Gupi's large work, "120 Drawings," — hung against a dramatic black backdrop in the entryway of 7CC — is reminiscent of stop-action frames in an animated film. A line with a life of its own spins out into a shape (is that a T-Rex? A dog? Homer Simpson?) and then dances off again — all within the precisely delimited geometry of a white square. Gupi has trained her analytical eye on the power of simple lines in American culture: "I have been looking at the Simpsons cartoons, because the Simpsons are drawn with straight thin lines. But, at the same time, the lines capture the form and the shape and the expression, and everything comes together."

She drew strength and inspiration from her own heritage, as well, returning to an 11th century Shiva temple in India that is famous for 1008 pillars, artistic interpretations by different sculptors in different epochs. Inspired by the abstraction emerging from the stone, she returned to Boston and began work on "120 Drawings."

As Gupi explains: "I came home and took square Post-Its and started making drawings. I was manipulating them fast; I was trying to create silhouettes and forms which fit into the two-dimensional square space." She notes that in Hindu culture, the gods have 108 names — and that although her original goal was 108 drawings, she seized the moment of ink on paper (or Post-It) and expanded on her initial vision.

Two other works that can be viewed together in 7CC show the playfulness — and layered meaning — in the process of folding and unfurling a simple line. "Eighteen Suspended Coils" — clusters of of aluminum armature wire hanging from the staircase in the center of the 7CC lobby — are the result of her discussions about the Hilbert curve with Erez. "We spent time playing with wire, trying to fold it," Gupi writes in her journal. "I don't think that [Erez] expected me to give him the wire and ask him to show if his hypothesis works. It is interesting how he concentrates on **folding** the wire and refers to it as a puzzle. For me, I am interested in **unfolding** the wire; it can literally take countless forms."

Viewed from a different angle, the silvery coils look a bit like protein folding. Wrestling with wire as she tried to assemble a Hilbert curve in eight segments, Gupi found parallels in bharathanatyam, a 3000-year-old form of Indian dance, and its interplay of gesture and cognition. "It is like a mudra (gesture) in bharathanatyam," she writes. "These gestures apparently affect specific areas of the brain for the dancer — could be something similar to that with the genome, where the ways it folds or unfolds could affect the toggle on and off…"

"Synthesis V," nearby, hangs in contrast: it is a layered painting of untangled lines, rendered in thick strokes, in blacks, whites, and grays — with hints of color and life peeking through. "I was playing with untangled lines, and I was thinking of 'unfolding' as a concept for what happens at the Broad, the different kinds of linear connections that you make at the Broad. I was also working with Catherine Luce at the time, looking at neuro-networks."

The other paintings in her "Synthesis" series are red, yellow, blue, and green. "The reason I chose these colors was because of a question [core faculty member] Todd Golub asked me," Gupi says. "He was talking about how amazing it was that the CGAT genetic sequence is just four different things, but makes up an infinite mass of information, with all the things that run us. However much you unfold, there is more to unfold. The reason I titled this series 'Synthesis' is that we as researchers and artists are trying to pare down the problem to its simplest essence — then try to put the elements back together to see whether it makes a whole. It's one of the important components of experimentation, and one of the things I wanted to see as an artist, and to do."

We want to hear from you! Have a comment or a suggestion about the artwork? Email art@broadinstitute.org

Further reading:

Guhapriya Ranganathan's website: http://www.guhapriyaranganathan.com

Work cited:

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