

Sets & the city: World Science Festival 2012, New York-style (Part 1 of 2)

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(Phys.org) -- New York City is *the* nexus of all things intellectual, cultural and academic. (Being a native New Yorker, I admit being somewhat biased.) Either way, one highlight in this complex and vibrant metropolis is the annual [World Science Festival](#), founded in 2008. World Science Festival 2012 was a nearly week-long orchestration of myriad events focused on a wide range of topics embracing not just science, but

also art, architecture, film, music, and technology.

The Festival was co-founded in 2008 by [Brian Greene](#), quantum physicist, string theorist, Columbia University professor of physics and mathematics, and bestselling author of *The Elegant Universe* and *The Hidden Reality*; and [Tracy Day](#), Emmy Award-winning journalist and television producer. The annual event brings together many of the world's leading scientific minds with renowned artists and influential thinkers for a five-day celebration that, through discourse and debate, conversation and performance, the arts and exhibitions, allows everyone to experience science in a unique and thrilling way. Since its inception, the Festival has attracted some 600,000 people to over 200 original programs.

Prior to the Festival proper, a Gala Celebration hosted by the inimitable [Alan Alda](#) – a Visiting Professor at [Stony Brook School of Journalism](#), working with the [Center for Communicating Science](#) – was held in recognition of the Festival's fifth anniversary and ongoing success. A *Performing Arts Salute to Science* brought together leaders in science, theatre, music, art, education and business for an evening that celebrates both the content and the culture of science, while raising essential support for the Festival's mission and programs. The event featured Brian Greene, violinist Joshua Bell, Emmy award-winning actress Debra Monk and other Broadway luminaries - Todd Ellison, Rose Hemmingway, Paige Faure, Eryn Murman, Abbey O'Brien, David Hibbard, Drew Gehling, the dancers/illusionists of [MOMIX](#) – and my personal favorite, TONY award-winning performer [James Naughton](#)'s hysterical over-the-top performance of his piece [Stress](#) (note that the linked video is the same piece, but not recorded at the World Science Festival Gala).

The first WSF2012 panel discussion I attended was *Artist as Innovator: Visions of a Floating City*. Held at New York's iconic Metropolitan

Museum of Art, *Artist as Innovator* was a multidisciplinary science-meets-art look at [Cloud Cities](#), artist Tomás Saraceno's vision of a floating city. The immense grouping of interconnected pods – now installed on the Metropolitan's rooftop – was inspired by Saraceno's investigations into neural networks, optimal packing algorithms, bubble geometry, balloon flight, cosmological spatial patterns, and three-dimensional spider webs. Moreover, *Cloud Cities* redefines the phrase *open to the public*: Museum visitors can enter the structure and navigate through its maze of dodecahedron pods. (The installation runs through November 4, 2012.)

Saraceno spoke prior to the panel discussion, giving a near-light-speed tour of his work that led to *Cloud Cities*. His range and experience extends from NASA and arachnid biology to solar energy and neural networks, and his energy and imagination were evident. Saraceno was then joined on the panel – moderated by Peabody Award-winning radio producer Julie Burstein – by arachnologist Peter Jäger, astrophysicist Mario Livio, astrobiologist Christopher McKay, and architectural theorist and Dean of [Columbia University Graduate School of Architecture, Planning and Preservation](#) Mark Wigley.

The questions were varied and the answers spirited, although the discussion itself seemed a bit brief. In any case, the arachnid-obsessed Jäger – who has discovered more than 200 species of spiders in past 10 years alone, including one he somewhat humorously christened *Heteropoda davidbowie* – spoke about his collaboration with Saraceno. “Tomás called to say that he needed a spider expert to have a three-dimensional spider web scanned, greatly enlarged and installed. I said it was impossible – but he did it! As a scientist, I start with known limitations, but as an artist, Tomás has an idea and goes with it – so here we are.”

McKay, a research scientist at NASA Ames Research Center, whose

research focuses on the evolution of the solar system and the origin of life, is leading an effort to establish a Mars habitat suitable for humans, initially by conducting various [field research projects at Earth's most extreme environments](#). These include not only the aptly-named [Haughton Mars Project \(HMP\)](#), [Canadian Arctic](#) and [Mars Desert Research Station, Utah](#), but also sites such as [Spitsbergen \(Svalbard\) Island](#), [Rio Tinto, Spain](#), [Pavilion Lake, Canada](#), [Mojave Desert, California](#), [Mount Kilimanjaro, Africa](#), [Axel Heiberg Island, Nunavut, Canada](#).

Even more ambitious are his group's [recently-funded](#) plans to transport sterilized plant seeds to the Moon for cultivation and – critically – replanting seeds produced by that first exoplanetary generation. (Sterilization eliminates Earth microbes from the seed without affecting its genetic material or ability to sprout, grow and produce viable seeds of its own.) In that context, McKay stole the show with a one-liner repurposed from (no surprise) *Star Trek*: “We want to grow where no one has grown before.”

Mark Wigley (who has also recently appeared on [Critical Thought | TV](#)) contributed some of the discussion's most thought-provoking comments. “I think we know more about life on Mars than we do about life on Earth – by which I mean that by the year 2015 there'll be 9.3 billion people living on this planet, and 70% of them – seven billion people – will be living in cities. No one has any idea what that means. None at all – not even the beginning of an idea.” Part of the problem, Wigley adds, is that cities (which he describes as a technology for maximizing connectivity) are evolving more quickly than most technologies – and faster than the institutions designed to think about them as well.

From a different perspective, Wigley adds that while it is the cosmos that seems mysterious, “what's really strange is the world in which we live.” As an example, he pointed out that even something as basic as the

concept of *home* – and even of *room* – is highly variable. “The conceptualization of home has vaporized and almost completely dispersed. For example,” he illustrated, “a teenager’s idea of home is probably more in his or her cell phone than it is in an actual house.”

Next up (this time at Hunter College) was *Madness Redefined: Creativity, Intelligence and the Dark Side of the Mind* – a profound, humorous and ultimately inspiring panel discussion addressing the likely possibility that the so-called *tortured genius* or *mad scientist* may actually be more than folk legend. Based both on research showing that bipolar disorder and schizophrenia correlate with high creativity and intelligence, the panel discussed a range of issues, including the role of environment in mental illness, the possibility that certain traits related to mental illness are being selected for in the human gene pool, and the border between brilliance and madness.

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Moderated by Cynthia McFadden, co-anchor of *Nightline* and recipient of the Emmy, the Peabody, Dupont, and Foreign Press awards, the panel featured [James Fallon](#), an internationally recognized neurobiologist; [Kay Redfield Jamison](#), a psychologist transformed her own struggle with manic-depression into a lifelong career researching the illness and its treatment; and [Elyn Saks](#), a mental health law professor focused on legal and ethical issues surrounding mental illness.

Perhaps the most engaging aspect of the event was the courage and honesty with which each panelist discussed not only his or her own mental illness, but the professionalism and clarity that informed the impact that illness had visited on their personal lives. The audience therefore had a rare opportunity to have both emotional and intellectual insight into these disabling yet sometimes enhancing conditions. Saks, for example, described with great precision the way that, in

schizophrenia – her own affliction – traits associated with high creativity (such as the ability to hold contradictory concepts simultaneously in one’s mind) infiltrate and thereby compromise more deliberative, rational cognitive processes.

Aside from the occasional humor found in their comments, Fallon was disarming when he unabashedly acknowledged accidentally discovering that his own brain scans (one of his key areas of expertise) were indistinguishable from those of sociopaths. With this realization as an impetus, he began asking colleagues, friends and family members if he displayed any characteristics that would indicate such a condition. To his great surprise, they all answered in the affirmative – but they only described annoying behaviors. In other words, despite his diagnostic brain images, Fallon was not classically sociopathic – a positive outcome he attributes to his supportive upbringing.

At Hunter College again the following evening, [John Hockenberry](#) – award-winning radio, broadcast television and print journalist, co-host of WNYC and PRI's *The Takeaway*, host on *The DNA Files*, and contributor to *The Infinite Mind* – moderated a forward-looking discussion entitled *Quantum Biology and the Hidden Nature of Nature*. The panel featured [Paul Davies](#), physicist, cosmologist, astrobiologist and Director of Arizona State University’s [Beyond Center for Fundamental Concepts in Science](#); [Seth Lloyd](#), a mechanical engineer at Massachusetts Institute of Technology who was the first person to develop a realizable model for quantum computation, and who’s now focused on the quantum mechanics of living systems (which he refers to as [quantum life](#)); and [Thorsten Ritz](#), a biophysicist at the University of California, Irvine interested in the role of quantum mechanics in biological systems, [ranging from photosynthetic light harvesting systems to sensory cells](#).

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It should be noted that despite increasing evidence from areas as diverse as [bird navigation](#), [photosynthesis](#) and [human olfaction](#), the role of quantum events in biological systems is still hotly debated. In general, the arguments against quantum life have centered on dimensionality (distances between components of biological systems are too great), temperature (biological systems are too warm), and standard biophysics (quantum effects statistical zero out at higher levels of scale). As demonstrated by the history of science, however, facts often turn out to be incorrect beliefs – and these long-held dismissive assertions about quantum life may well be that.

Consider the above-mentioned research. Delving into the ability of some migratory bird species sense very subtle variations in Earth's magnetic field, scientists at University of Oxford found that quantum superposition and entanglement are not only present, but sustained for tens of microsecond – far longer than artificial molecular systems, which, moreover, typically operate only at cryogenic temperatures. Similarly, researchers at University of California, Berkeley analyzed quantum entanglement in light-harvesting biological complexes, demonstrating what they describe as the first rigorous quantification of entanglement in a biological system. Finally, scientists at University College London showed that while molecular odorant receptors are not sufficient to explain our olfactory sense, tested their proposal that quantum electron tunneling from a donor to an acceptor mediated by the odorant provides critical odor discrimination in biomolecular systems – and found that proposal consistent both with the underlying physics and with observed features of smell.

Hockenberry concluded the discussion with a (perhaps inevitable) question about the role of quantum mechanics in the emergence of consciousness – and Lloyd gave a balanced and insightful response. “Quantum mechanics is strange and mysterious...the origins of life are strange and mysterious...consciousness is strange and mysterious...and

Donald Trump's hair is strange and mysterious. That doesn't mean that they're all the same thing or strange and mysterious in the same way. However," he continued, "there is one place where we really *do* know that quantum mechanics plays a very important role in developing life – and that is in the introduction of variation. Classical mechanics doesn't give you any mechanism for introducing variation – it's completely deterministic. Quantum mechanics, on the other hand, is probabilistic, and can inject all kinds of information into the universe. In fact, the only explanation we have for why the universe is so varied and interesting – given that it came from an initial state that was incredibly uniform, the quantum state was incredibly uniform, the laws of physics were simple, and if that were a classical universe, it would have stayed simple – is that quantum mechanics is constantly injecting all kinds of little fluctuations that can become seeds for the formation of galaxies, or for that matter, little mutations that become seeds for cancer when an ultraviolet photon zaps one of our cells. This variation is being introduced by quantum mechanics."

Part 2: phys.org/news/2012-08-city-wor...e-festival-york.html

More information: Sustained Quantum Coherence and Entanglement in the Avian Compass, *Physical Review Letters* 106, 040503 (2011), [doi:10.1103/PhysRevLett.106.040503](https://doi.org/10.1103/PhysRevLett.106.040503)

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