Transcript
Magic Recipes: Science and the Profound Meaning of Spring
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It's spring! In Harrisburg the daffodils came up in February this year, which is kinda scary, and, a completely different service topic.

Whenever it comes, I often experience spring as a big sigh of relief. Some of the layers of heavy clothing come off and I can move more freely; snow and ice give way to spiky green rockets shooting out of the soil, which begins a countdown to riotous color, followed by hyacinth ecstasy drifting on the wind like free hallucinogens, but better.

Little peeps begin to fill the social—not those peeps!—peeps begin to fill the social media feeds of those lucky enough to have chickens.

For much of my life, that was me. I hatched my first chickens at age 8, and every year after that, until college. My little brother hatched ducks and my sister had geese.

Every spring we would fire up the incubator and fill it with eggs, multicolored chicken eggs, larger greasy-looking duck eggs, and big elegant goose eggs. Chicken eggs take 21 days to hatch. Ducks take around 28 days, and geese average about 32, which meant that after three weeks of excited anticipation, we had non-stop awe and wonder for 11 or 12 days every spring.

But you never get 100%; there are always some eggs that don't hatch. Sometimes there are stragglers that hatch a few days late, so we would wait until like 35 days, just to be sure. There were always some duds.

There was another reason to procrastinate turning off the incubator. No one wants to mess with those duds, because they're rotten eggs, and rotten eggs can explode. If any of that gets on you, I guarantee the smell will cost you your most recent meal.
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So this disposal task usually fell to my mom, who would carefully carry the whole incubator out into a field, then gingerly throw each egg as far as she could without exerting too much stress on the shell.

One year, she picked up the last egg, a duck egg, and as her windup brought it near her right ear, it peeped. She couldn't believe it. It peeped again. She put it back in the incubator, took it back to the house, and plugged it back in.

A day later—mind you, this is almost ten days after the normal duck incubation time—an odd duckling hatched out like a boss. It was too much younger than its siblings to be raised with them, so it became a pet. It was pretty special, and I'll explain why in a few minutes.

If you've seen birds hatch, or watched a person being born, you've probably felt this

sense of deep magic and mystery as they emerge; new life emerging!

Well, this is all pretty well described by molecular bio-genetics, so in that sense it's not quote-unquote "magical" or mysterious at all.

And therein lies the quandary and the opportunity of being alive at this time in the history of science knowledge.

We rest on centuries astounding success at describing the mechanical details of cause and effect, down to the constituent parts of atoms so small that a single grain of table salt contains about as many atoms as there are blades of grass on Earth. [**1.2e18**]

That's science; we take things apart to see how they work. Then we take those parts apart, and so on, reducing every object and phenomenon to its parts. And it's been phenomenally successful! But some things, some really important aspects of reality get lost when you reduce a whole system to its individual parts.

For example, is surface tension a real thing? Of course it's real, the water strider can feel it, but is it a thing, an object? It's not a thing, though it acts like one, and it's not made of things, either. Surface tension is a phenomenon that happens when lots of water molecules interact with one another at the boundary between water and air; it's made of relationships between the molecules, not the molecules themselves. Add a drop of soap, and surface tension disappears. The molecules are all still there, but the soap is like a home-wrecker; it interrupts the relationships.

Science has been so successful at revealing reality's mechanisms that most of us still walk around with a mechanistic worldview. –Of the universe as a kind of clock, ticking away, and when the season-hand ticks around to spring, click whirr and out come the coo-coo-peeps. [coo-coo clock]

And this is why many of our traditionally-religious neighbors and friends are wary and weary of science. They hear science saying "It's all nothing but molecules!" and "it's nothing but atoms and the laws of physics" and reducing (there's that word again) everything to the mechanical, the mundane.

Some scientists are still saying that, but it's only half the story. Because many of the things we take for granted as being "real things" are actually more like surface tension—made of relationships that disappear when you take things apart. They're not made of parts, and they're not mechanical; they arise out of relationships, but they show up as things in their own right. Things like planets, and plants, and people.

What I'm touching on here is the relatively new science of emergence, which studies properties of matter that aren't themselves matter but that arise out of interactivity, out of relationships.

This is my cousin Joe (rooster). He's quite the looker, huh? I told him, he should have

gone into modeling.

Before emergence, we could say, truthfully, that Joe is nothing but a bunch of atoms. It's still true; the only things there are atoms. But to say "nothing but a bunch of atoms" is to neglect a galaxy of things that are also true about him: awareness, flight, self-regulation, sexuality, and many more, not least of which is his roosterness. Those same atoms could be reassembled to make a dog, or a compost pile, or a smoothie. Different Dog image.

So is the rooster the atoms, or is the rooster something that emerges from a particular arrangement of atoms? That unique arrangement hints at what scientists call "constraints." You only get surface tension under the right conditions: liquid water, at the surface, no soap. You only get roosters when the atoms are constrained by the patterns built into Joe's unique genetics, his magic recipe.

Under the right conditions, from "nothing but" atoms comes "something else," something new and different from the parts: a fine-looking rooster.

Biologist Ursula Goodenough uses "The Mozart metaphor" in her book "The Sacred Depths of Nature." She reminds us that a Mozart sonata CAN BE understood as nothing but hammers hitting strings, but remember, the strings and hammers aren't the music, they just create the music. The music is something else that arises from nothing but hammers hitting strings. Also, the music is no less beautiful and soul-enriching just because we know about the mechanics of a piano.

The sonata can also be reduced to notes on a paper. Here again, the notes and the paper aren't the music, they just describe the music, the way our science knowledge describes reality. Knowing that it can be reduced to notes on a page oughtn't decrease our appreciation of the music. If anything, it's MORE soul-enriching when we can study the sheet music and sense the depth and intricacy of Mozart's genius in creating it.
new image here
I understand the basic biochemistry of development. I've taught it. And when I think about emergence, there remain two aspects that seem truly magical to me, if not miraculous. OK, it's actually three, but the third magic is the child of the first two.

The first is this idea that a whole can be more than the sum of its parts. This is like 1+1 = rainbows. It defies the mechanistic worldview.

Emergence often seems to require large numbers of parts. One amoeba + one amoeba = nothing but two amoebas (Amoebae?), but if you keep adding them, at some point you get a bunch of amoebas and a whole slew of somethings else: group coordination, specialization into fruiting bodies, the ability to solve complex mazes, and if you give them a few hundred million years, they might evolve organs, and brains, and the something elses of pianos, and poetry, and popes.

Which brings me to the second magic, the one about recipes. Reductionism looks at

things and asks, “what parts is this made of, and where did they come from?” Carl Sagan famously referred to this process by saying, “If you wish to make an apple pie from scratch, you must first invent the universe!” That process works backwards: you trace apples back to apple trees, apple-tree-ancestors, the first living cells, to the origins of planets, and matter, and so on.

Dr. Sagan was almost giddy because his generation was the first to be able to tell the story forwards, a story now known as Big History; Everybody’s Story; the Great Story; the Epic of Evolution, Big Bang cosmology, and others. It’s the story of the emergence of everything.

So that second magic I’m zig-zagging towards is “self-assembly.” It’s wild enough that a system can be more than the sum of its parts. But it’s downright mind-blowing to contemplate the self-assembly of such systems. And, as the dream-woman in the story hinted, it’s not just living things that self-assemble.

All. This. Stuff. From baby ducks to human societies are what atoms assemble themselves into under the right conditions.

And here’s where the two magics make a baby together, because we now know that the universe began with energy. Insanely bright light, and nothing else. The first matter condensed out of that light during the first second of time, but there was no matter–no atoms– there at the beginning.

As this great mystic and prophet revealed, matter is a form of energy, tremendously condensed, and it exhibits different properties from energy—emergent properties—like mass, inertia, and gravity.
Energy is not a thing. Energy is potential, it’s action, it’s verbs.

And I lied to you few seconds ago, a lie of omission. Light wasn’t quite all there was at the beginning of time; there was also an invisible set of constraints, what we call the laws of physics.

In that first less-than-a-second, and constrained by patterns built into reality, from nothing but energy emerged the something else of matter.
There’s nothing mundane about that!

I’ll offer more about the great story in the workshop that follows today’s service. I hope you can stay. But to make a 14-billion-year-long story short, everything in the universe is an emergent expression of energy, interacting with itself in increasingly complex and interesting ways.

The light energy that came out of nothing at the beginning of time is the ultimate magic recipe, an Everything Seed from which it self-assembled an entire universe, constrained by physical laws, and in time spawned uncountable other self-assembling miracles, like stars, galaxies, planets, and living things that eat sunlight, and turn it into daffodils,

and ducklings, and dignitaries.

For me, the profound meaning of Spring is that the miracle of emergence is popping up all around me, literally shooting up out of warm soil, newborn oak leaves waving at me like little children, wild turkey chicks wandering my neighborhood with their mothers, millions of magic recipes all unfolding like little universes everywhere I look!

And each one is unique! Every creature that reproduces sexually, which is pretty much all plants and animals, is genetically unique. Every one of those seeds and eggs out there can self-assemble into something completely new, a combination of traits that the universe has never seen before.

Speaking of unique individuals, there's a reason that odd duckling of ours took so long to hatch. We had two kinds of ducks running free on our farm: Rouens and Muscovies. Those aren't two different breeds; those are two different species. She was an interspecies duckling, a rare and sterile mule duck. When she started laying eggs, they didn't have yolks; they were just duck eggs filled with egg-white. Amazing!

Wednesday was Passover, today is Easter, then Earth day on the 22nd. Spring holidays, celebrating freedom from bondage, resurrection, and humble stewardship, respectively. In a universe built on relationships, and the surprising something elses that can arise from them, all three holidays seem perfectly situated in springtime.

In his song Holy Now, Peter Mayer (who also wrote Blue Boat Home) sings, "Wine from water is not so small, but an even better magic trick is that anything's here at all!" Everything is holy now.

Spring brings such an embarrassment of holy riches that we trip over them on our way to the mall. There is no spring in the tropics, you know.

Spring is a gift, but only certain latitudes get to open it. Don't leave it unopened just because you have shopping to do, or meetings to attend!

And in the southern hemisphere, it's autumn now. Autumn will come here in time, too, so if your soul could use a little emergent holiness, now's the time! Get out there and soak it in! Watch the seeds and eggs create something new, something wondrous from nothing but atoms in motion.

Right now, right out there, new expressions of cosmic creativity that have never existed before are showing up for their brief time in the sun, on a lonely blue dot in a terrible vastness of mostly empty space.

Get out there and soak it in! Be reminded that this same magic lives and works inside you, with every breath and bite and beverage! Divine light from the beginning of time, expressing itself in and through you!

Get your hands in the dirt. Plant some magic recipes. Do it with children, and tell them about the magic, and the uniqueness of each seed or egg.

Heck, you can even eat some of these nasty things after Easter when they're on special and too cheap to pass up. For more fun, microwave them first.

Just don't let spring come and go without letting it nourish you, deep inside. Take spring to heart. You never know what "something else" might emerge from "nothing but" a relationship with nature. May it be so.