

# Evolution 2.0 Newsletter

December 2020

## The Tadpole with Eyes on Its Tail

"Hi, Perry. After several decades in cancer research - and one decade as principal deputy of the National Cancer Institute, I remain amazed that a disease that will take the lives of 25% of the US population is always a 'lightning bolt' for the newly diagnosed.

Even with all the progress we've made, cancer remains for too many a death sentence - often due to advances in knowledge unequally delivered. **I have lost my whole family to cancer save one, my brother, and while knowing everyone in the field, I could not save a single one of them.**



I have likely held more think tanks, and spent more of the US government's money on evolution and cancer than anyone - but evolution still sits outside of oncology. That must change - **but will only change if those really knowledgeable in the field build a community that can move beyond the theoretical to do rigorous research that can change care** - no small challenge.

In my 15 minutes on the agenda, that's going to be my message. Biomarkers of tumor evolution are perhaps the highest value proposition in cancer research, but they must be validated and receive regulatory blessing to enter the cancer treatment process. It is doable, but enough of us have to want to do it, and the money has to come from somewhere. Looking forward to your talk this week.

Ann"

That's Ann Barker, who, as she mentions, was the *Principle Deputy of the National Cancer Institute* for a **decade**. If anyone knows the "State of Cancer" in today's world, it is Ann Barker.

Our Cancer and Evolution Conference was the first shot fired in the war Ann believes must be waged, if we are ever to stop losing family members, friends, mentors, and colleagues to this dreadful disease.



Ours was the first cancer conference to bring together world-class experts from *many disciplines* to present their latest and most profound discoveries bridging cancer and real-time evolution. This cross-disciplinary approach is absolutely essential for understanding and curing cancer.

But that's not how things work now. The way things work now is that one discipline does its thing and rarely, if ever, shares or collaborates or interacts with the other disciplines.

I got my first glimpse into how academia and scientific research does work when James Shapiro offered to introduce me to anyone at the University of Chicago who I thought might be helpful in my Evolution 2.0 project. I started looking around, going through faculty profiles and credentials. What I found was, "This guy knows more than anybody in the world about – the folding of some particular protein." And, "This gal knows more about one strain of bacteria than anyone on the planet." Every single one was *an inch wide and 12 miles deep*.

I quickly discovered when you ask "Big Picture" questions, the answer you almost always get is, "I don't know, but I think somebody in the department down the hall knows the answer." You walk down the hall and ask THAT department the same question and they say, "I don't know, I thought the department down the hall knew."

Nobody knows the answer to that question. Not enough people are thinking about the *big* questions that require knowledge beyond more than one narrow discipline. They're all thinking about their *little* questions. We imagine somebody else is thinking about the bigger questions... but they're not.

I'm not saying that scientists don't think about big questions. But unless you're a rock star, you don't get to opine about big questions. Not officially anyway. You must stay in your lane.

This would be like... oh, let's say the various departments of a big corporation never talking to each other. Not sharing information, insights, and ideas for cutting expenses or growing profits and revenue. That company would die a slow, miserable death. But in this case, it's PEOPLE who are dying slow, miserable deaths.

In fact, in my particular niche of business consulting, looking outside your own business for a great idea for YOUR business is a well-worn practice. We say, "You'll never get a great idea FOR your business from INSIDE your industry." So many clients of mine have gotten "Eureka!" ideas from smart people *completely outside* their world, it's practically a proverb.

So it might be difficult for some of us to understand just how intractable of a problem this is to overcome.

One saying that's relevant to conquering cancer is: "You can accomplish almost anything as long as you don't care *who gets the credit*."

In the business realm, if a bowling alley owner gives a chiropractor a great idea for his business, he doesn't care that he doesn't get credit for it. There is what you might call an "abundance" mentality in entrepreneur culture. Your success does not limit my success.



Things are *very* different in academia. Credit is everything. Getting published. Getting cited. It's why you exist!

Even when a scientific paper has 17 names on it, there's still political jockeying for top credit. Whose name goes first? Whose name goes last? Because when the paper is cited in other publications, only ONE name, the first, will be cited. It will say *Johnson 2009*...not *Johnson (and 16 other names) 2009*. There's nothing particularly "fair" about this either. Usually the guy or gal who did most of the work and submits the paper, is the last name cited. And the first name is just the highest-paid guy or gal!

This means everything to researchers. It means tenure, security, respect, grant money...

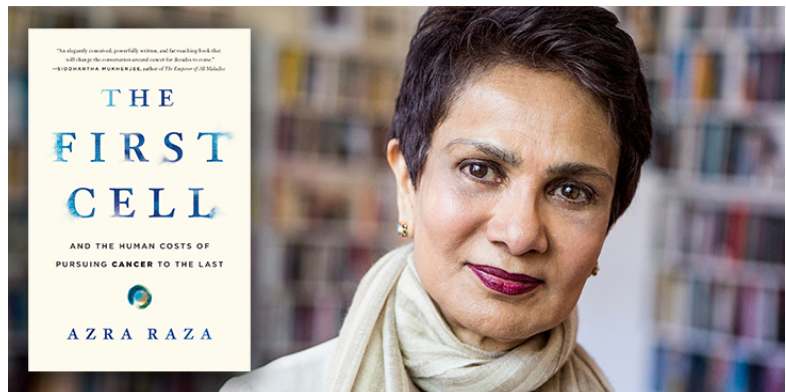
But it must change. Because this incestuous, silo-ed approach is getting us nowhere fast...and it's killing the people you love.

Azra Raza gave the keynote at our conference. Doctor Raza is the Chan Soon-Shiong Professor of Medicine and Director of the MDS Center, Columbia University Medical Center in New York City. A practicing oncologist who sees 30 to 40 cancer patients weekly. Her life is devoted to the early detection and prevention of cancer. And here's what she has to say about this problem:

"In 1977 I was treating a particular cancer with a particular therapy called '7+3'. FIFTY years later **I'm still treating that cancer with 7+3!**" Azra told us a story of a Persian queen who lived 2600 years ago. Here's how the story was told in the *New York Post* in a 2010 article on cancer...

The powerful Persian queen Atossa, immortalized by Greek historian Herodotus in 440 BC, experienced every woman's worst nightmare: a bleeding lump in her breast.

Today, Atossa would undergo a combination of possible cures – surgery, radiation, chemotherapy, targeted gene therapy, among others. But several millennia ago, her options were limited.



She wrapped herself in sheets and succumbed to a self-imposed quarantine until – and we can only guess – the pain became so severe that she **allowed her slave to cut off her breast.**

Although the former seems more humane, and certainly more modern, **it's unclear how much progress she would have made a few thousand years and a few billions of dollars in the future.** Since the records don't say when Atossa died, we don't know how well the extreme surgery worked. And since there's no way to test the current cancer-fighting drugs on



her now, we can't conclude that they would be effective. The sad truth is that her life expectancy could have been exactly the same.

If the highlighted sentence in the paragraph above doesn't fill you with righteous indignation, I don't know what will. TWENTY-SIX CENTURIES and billions of dollars...and hardly any progress to show for it!

A big part of this problem is: Ninety percent of cancer research papers begin with the premise that cancer is a disease of gene mutations. That may be *somewhat* true. But that is *far* from the only way to define cancer. Regardless, this is the drum that the cancer "industry" has been beating for decades.

The definition of cancer I find most helpful and accurate is: cancer is a disease of **identity**. Suddenly a cell thinks it's a single cell organism, rather than a cooperative industrious liver cell. Suddenly it starts acting like a radical terrorist rather than a member of a team. It starts sucking up resources, recruiting new blood vessels and craving sugar.

Your immune system (or your oncologist) decides to kill it. This causes it to switch on its evolutionary machinery and begin evolving *for the purpose of evading the threat*.

So... cancer is when the cell's evolutionary machinery gets switched on and nobody knows how to switch it off. It starts evolving like an individual when it should be functioning as a member of the team.

Michael Levin, who also presented at our conference, has done some Frankenstein-like experiments on tadpoles that illustrate this theory in shockingly vivid ways.

Here is the short, plain English explanation of what Michael has been doing:

Michael induces cancer in tadpoles using bioelectric fields. Then he reverts the cancerous cells back into normal, functioning cells. You read that correctly. He has discovered he can "turn cancer on and off" in these cells! He can essentially change their "identity" from normal law-abiding citizen, to radical violent terrorist, and back to normal peaceful citizen!

And yet Michael's work remains relatively obscure.

Now for the Frankenstein part. Michal has discovered that by altering these bioelectric fields, he can take the eyes from the head of the tadpole, stick them on the tail,



and they will grow. Not only will they grow, but they will SEE. Yes, the tadpole will be able to see out of its tail.

The tissues on the tadpole's tail recognize the eye *and know what to do with it*. They route the neural signals to the brain. The brain starts getting optical images from those eyes and *figures out what to do with them*.

These experiments all by themselves turn entire departments of genetics and embryology completely on their heads.

(I did an Evolution 2.0 podcast with Michael on April 10, 2020, called "Picasso Tadpoles." You can listen to on [Evo2.org/podcast](http://Evo2.org/podcast) if you want to hear more.)

One more example... and it's the most Frankenstein of all. Michael has scraped skin and muscle cells off of tadpoles, put them in a slightly different bioelectric field -- this clump of cells then forms into *an organism*. It's about one millimeter long. It grows little fins or flippers. It swims. It does not eat. It does not reproduce. And it is not a tadpole. It lives for about five days. It is a living thing.

So... what is it?

Because the bioelectric fields are suitable for them to form a structure, that structure then assumes an **identity** and...figures out what it wants to do. But precisely what "identity" does it have? Ay, there's the rub.

Michael's experiments raise profound questions about the entire concept of self and identity. Philosophers have been toying with questions like this forever – via *thought experiments*. But now we actually have the ability to run *physical* experiments on them.

All three of these experiments are an "identity event." Michael has figured out how to get these cells to "forget or remember who they are."

**Surely if we can figure out how cells get their identity, we can cure cancer. Because Michael is using those bioelectric fields to induce and reverse cancer in tadpoles.**

We are not in the land of chemistry anymore, Toto. We're solidly in something more like psychology now. So if you can apply psychology to tissues and biology, then you just bridged disciplines. You just created a synthesis. You made vast realms of human knowledge in one department available to another department.

Michael put it to me this way, "If Isaac Newton had watched the apple fall out of the tree and said, 'That's gravity, but the moon orbiting the earth has nothing to do with gravity,' we would have never heard of Isaac Newton. Isaac Newton's genius was realizing, '**The force pulling apples and the moon is the SAME.**'"

In 1687, *nobody* would have thought, "An apple falling out of a tree in a straight line and a moon circling the earth do so for the exact the reason." Had you said that, they would have destroyed you on social





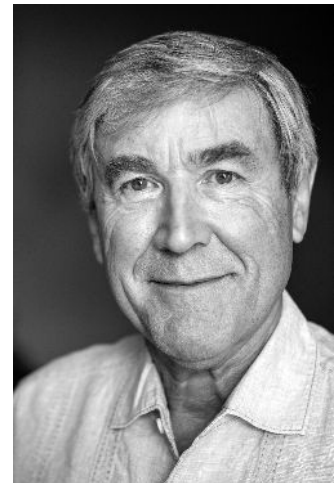
media and committed you to the loony bin. It was one of those brilliant insights that come around once every few hundred years. Staggering genius.

**Cancer needs an Isaac Newton.** It needs *many* Newtons. We need chemists, biochemists, psychologists, biologists, oncologists...who mostly don't talk to each other now...to start talking to each other and asking questions like, “How is this falling apple like a celestial body?”

Our symposium was a first BIG step in helping facilitate exactly that. A great many of our presenters felt very optimistic that we “broke the ice” between the disciplines and put some cracks in the foundations of the silos that keep them apart.

And all through my Evolution 2.0 journey, I've seen cracks in the silos that give me hope.

Ten years ago, theoretical physicist, Paul Davies, got a phone call from Ann Barker, whose email to me kicked off this newsletter. She was at the National Cancer Institute then. She calls Paul and says, “I was wondering if we could commission you to do some cancer research.”



Paul: “I’m a physicist, I don’t know the first thing about cancer.”

Ann: “That’s exactly why I want to hire you! The thinking has gotten stale, and we need an outside perspective.”

So, Paul, Kimberly Bussey, and some others at Arizona State University’s Beyond Center began working on cancer research. Physicists have a very linear, methodical, rigorous way of solving problems. They think in very different ways from biologists or chemists or oncologists.

To give you an analogy, a biologist and a physicist are about as different as a fitness instructor and a psychotherapist. One is in the gym and is all about the body...one is in an office with a sofa and a box of Kleenex and is all about the mind.

Paul and his team figured out that the genes most closely associated with cancer appear to have emerged in bacteria 600 million years ago. They concluded that cancer is a 600-million-year-old response distress.



They compared cancer to Windows Safe Mode. Cancer occurs when a stressed-out cell – let’s say it’s a lung cell – reboots itself. It “wakes up” in “Windows safe mode” (you know, that weird screen you get when your Windows machine crashes and restarts). This is a mode of operation that’s been observed in bacteria.

Cells appear to do the same thing, their evolution machinery switches on when under stress...but then won't switch off.



That's *one* version of what cancer is. One definition. (A pretty good one, in my opinion.) And the more definitions we get, the closer we will get to a cure.

But we won't get there with everyone assuming it's **ONLY** about gene mutations.

Paul models this interdisciplinary approach with his colleagues and students. On the advice of one of my colleagues who introduced us, I sent Paul my *Evolution 2.0* book a few years ago. I didn't hear from him for about two months. Then all of a sudden, I get an email from him: "I really liked *Evolution 2.0*. And it corresponds very nicely with the cancer research I've been doing. It makes sense from that perspective. So I'd like you to come and give a talk at ASU."

Three months later I find myself in a room with a bunch of Paul's grad students and postdocs. We're sitting around a table, they all take turns introducing themselves. I am *completely* intimidated. PhDs in astrobiology and molecular biology and just about every -ology you can think of.

But after about 15 minutes I noticed something about the way they were introducing themselves. They were not trying to look smart. They were not speaking in jargon and ten-dollar words. They were making a good faith effort to explain what they were working on in simple, plain English.

This is not normal. It was clear that they had been encouraged and taught to talk to each other in easy-to-understand terminology. They grasped that getting people from other disciplines to understand them was essential. To put their egos aside and explain as simply as they can. Paul and the people in his department must have trained them to do this.

And that gives me hope.

This is essential if we want to find a cure for cancer, and maybe save someone you love.

Honestly, I believe that if we can do *this*, **curing cancer will be the easy part.**

## What Can You Do Be a Part of Evolution 2.0?

Evolution 2.0 is me, my assistants Lorena Ybarra and Emily Brookins with volunteer Sam Bart. Plus a few other precious volunteers who contribute hours here and there. **We can really use your hands-on assistance.**

Another thing you can do to help is fund our virus research. I know of no one who is bringing a full-fledged "Evolution 2.0" viewpoint on virus evolution. It's 501c3 not for profit, so you can go to [evo2.org](http://evo2.org) and make a tax-deductible donation.

**Would YOU like to make a \* major \* contribution to humanity?**

If you want to make a dent in the universe... you *could* give your money to a Big Popular Cancer Charity (you know, one that has marches and 5K runs and marathons and such) where your money is guaranteed



to dig the current (failed) slash-and-burn paradigm ten feet deeper. There, you will get your requisite tax deduction. If you give enough, you will attend banquets and get wined and dined by professional “development staff” members.

Or... you could put your money where it really *will* shift the paradigm. The current model is broken beyond repair. We have a better model. My deep conversations with the Cancer & Evolution scientists during the previous year – combined with the fact that we now have a proper understanding of cause and effect for the first time – means our efforts have 1,000% to 10,000% better odds of hitting paydirt.

We are investigating scientific research projects *based on new, completely different assumptions*. Projects range from \$250,000 to \$100 million. If you’d like to make a dent in the universe, contact my office and I’ll introduce you to Blue Chip Renegades who will go down in history.

We could also use the following volunteers.

People who are skilled in...

- **Administration**
- **Project management**
- Finances
- Scientific papers, research, and projects
- Film (documentary screenwriters, editors)
- ALL forms of marketing ad copywriting; buying Google, YouTube and Facebook traffic; writing blog posts; shooting videos; podcasts; publicity angles, and news media

If any of the above piques your interest, please reach out and let us know. Email [evolution@evo2.org](mailto:evolution@evo2.org) with what your skills are and how you might like to help.

This is world-changing work. I believe that in 100 years everybody is going to acknowledge how important this is. I believe that down to my toes.

*It's not easy to get people to see how far-reaching this is.* Most people can't see past their next Facebook post. But we are shifting the foundations of civilization. We are moving the foundations of science. We're shifting the foundations of medicine.

And we could potentially save millions of lives. Maybe the life of someone you love. Maybe *yours*.

Carpe diem - Seize the day.

Perry Marshall

