Lessons from Nature and Evolutionary Biology for Collective Wellbeing

Guest: Dr. Elisabet Sahtouris

Niki Gratrix Hello, everyone. This is Niki Gratrix. Welcome. Today I have the great honor and privilege of introducing a fascinating and truly inspiring guest, Dr. Elisabet Sahtouris.

Dr. Sahtouris is an evolutionary biologist, futurist, author, speaker and consultant on Living Systems Design. She regularly travels all over the world lecturing on nature's principles and practice as revealed in biological evolution as useful models for organizational change applying them in the corporate world and in global politics and economics in our efforts to create sustainable health and wellbeing for humanity within the larger living systems of earth.

Dr. Sahtouris did her post-doctoral work at the American Museum of Natural History in New York, taught at the University of Massachusetts and M.I.T., and was a science writer for the *HORIZON/NOVA* TV series. She was invited to China by the Chinese National Science Association, has organized Earth Celebrations 2000 in Athens, Greece, and has been a United Nations consultant on indigenous peoples.

She is also a participant in the Humanity 3000 dialogues of the Foundation for the Future, the Synthesis Dialogues with the Dalai Lama, and consults with corporations and government organizations in Australia, Brazil and the USA. She is also the author of three excellent books, and her latest one being *Gaia's Dance: The Story of Earth and Us*. So, Dr. Sahtouris, we're absolutely honored to have you on the summit today. And a very warm welcome to you.

Dr. Elisabet Sahtouris Thank you so much, Niki.

Niki Gratrix So we have some amazing, wonderful themes on our summit that are very pertinent to the work that you do and that you talk about. And a couple of these themes, one of them is bacteria. And people are learning increasingly and have definitely learned about how important bacteria is for our health as it exists in the gut, the human microbiome, absolutely critical in chronic fatigue and autoimmune diseases.

And also mitochondrial function - so a few of us have become aware that mitochondria, in fact, come from descendants of ancient bacteria. In your book *EarthDance* and *Gaia's Dance*, you call these I think the "breathers".

So it would be wonderful if you could share with us a little bit of the history about bacteria. You call them the bubblers, the blue-greens, and the breathers. I love that analogy. And a little bit of history about how they brought life to earth and how they evolved through competition and ending up in a kind of collaborative system.

Dr. Elisabet Sahtouris Yes, well, you know, 4 billion years of evolution is a long time. And we've generally taught only the last quarter of it in evolution classes in biology in high schools and college and so forth. But the first half of evolution, roughly 2 billion years, was only about bacteria. They were the only life forms on the planet. But they were hugely successful.

Over that very long period time they expanded until they reached the highest parts of our atmosphere and down into the depths of the seas. And, of course, the planet looked very different back then. And we didn't see any of those green things or any plants or animals or anything like that on the earth, just these bacteria, which to our eyes would have been invisible if we could peek in.

But the very first ones were, the ones I call the bubblers, were fermenting bacteria, and they lived on the free sugars and acids that had just naturally formed on the surface of earth. And because they were so wildly successful at that fermentation, that bubbling that we still see in fermenting bacteria such as we use to make fizzy drinks or bread or the yeast for bread and beer and things like that, they ate up all that free food and caused global hunger, literally caused global hunger.

And so being very inventive as life is, a second kind of ancient bacteria evolved, the ones I call the blue-greens, which made food out of the remaining things there were which was just the minerals of the earth's surface and water and sunlight. They invented photosynthesis, in short. And that permitted a whole new wave of life to go on while the bubblers started to suffer from the gas that those blue-greens put out which was the oxygen gas.

And as we know, all green things, the blue-greens on the planet still do that. They take carbon out of the air. And they sequester it and make food from it and with, as I just described. And then they give off oxygen gas. And because they were also hugely successful, that oxygen was absorbed into the seas and the soils and piled up in the atmosphere as a deadly, corrosive gas.

So the bubblers that were left had to kind of dig underground to survive to get away from that atmospheric oxygen. But now we have bubblers and blue-greens on the planet. And what happens next is that the blue-greens and bubblers aren't enough. We need something more because the breathers that then evolve are oxygen consumers.

You see, that high level of oxygen piling up was dangerous and it led to this new explosion of life that I call the breathers who could use that oxygen to smash food molecules. But where were they going to get the food molecules from since the free sugars and acids were gone? They had to drill into these big bubblers that were sluggish and slow and eat them out from the inside.

And so these little breathers that were kind of high-tech, they invented electric motors, literally, that had nanotechnologists are trying desperately to create these today because they have more than 40 proteins in them. They have rotors and sputters and ball bearings and all the things that, fascinating to think about, that our motors have in them. And yet this happened billions of years ago on a planet with only bacteria.

So I'm constantly fascinated by the resemblances between the ancient bacteria and us in terms of their inventiveness and in terms of the problems they created and also solved.

So we now had this global pollution from all this oxygen and breathers are helping to solve that pollution problem by using up this oxygen, but they're doing it in this rather imperialism phase way of killing off the bubblers to use them as colonies.

And so the last phase of this bacterial life is where all three of them get together and form the only other kind of cell ever to evolve on earth, which is the nucleated cells that we are made of. And all of these partners gave some of their DNA into this library of DNA information we call the nucleus and the breathers became mitochondria which you mentioned at the outset and so on. The little cell organelles descend from these ancient bacteria.

So this is absolutely fascinating and is the first instance of what I call the bacterial maturation cycle or the bacteria as inventors of a maturation cycle that then continues on through all of evolution where you have a highly competitive, creative, youthful phase. And then the discovery comes that it's more energy efficient—that means cheaper—to make friends of your enemies and not to invade each other, but to cooperate in larger unities.

It's a cycle from this individuation from something that was a unity, the earth itself in this case, packaging itself into little bacteria, then having the competitive phase because this individuation causes tensions and conflicts since different individuals are in different situations and have different needs and so forth.

And that's the Darwinian phase of evolution, that youthful phase is what we're taught in school as all evolution. But it's only that youthful phase up until the discovery time when it becomes too expensive to keep competing and cooperation kicks in big time, whatever competition is left becomes friendly competition and not hostile and then you can move on into a new phase where you invent these larger entities. So we can talk a little more about that cycle as we get into what we humans are doing on the planet.

Niki Gratrix Yes, that is absolutely fascinating. I was amazed when I first heard about this theory and read your books. It's so true. We think that the world is survival of the fittest and this mechanistic fight for survival, win-lose model, Darwinian thing.

And I think a lot of that based on behavior actually makes many of us the stressed out, tired, and ending up with fatigue just from thinking that's how the world works. It's such a gigantic departure from the story of evolution we've been indoctrinated with. So I'm fascinated if you could share any other examples of nature as a collaborative affair, if you like, some other ideas from nature and maybe even talking the Gaia theory itself?

Dr. Elisabet Sahtouris The interesting thing about that maturation cycle is the way it continues through the rest of evolution because now we have bacteria and nucleated cells on the planet. And the nucleated cells, of course, are the first single-celled creatures. They're neither plants nor animals at this point. We don't know which is going to come out of that or how the two will come out of that.

But they spend another billion years—remember, 2 billion years of bacteria—and another 1,000,000,000 where those big, giant, cooperative cells go through their youth because even though they were the fruit of cooperation, they're now new on the planet. So they have to go through their own youth. And they become competitive and inventive and creative. And they develop a myriad different lifestyles and start building up

different kinds of niches on the planet that's now complexifying because of their presence.

And so after a billion years of their creative competition and hostilities phase, they form multi-celled creatures. Now those are the two biggest steps we've had in evolution- the formation of the nucleated cell by bacteria and the formation of multi-celled creatures by those cooperatives the bacteria build. And again the same thing happened that they were under pressure and it became too expensive to compete. And all kinds of negotiations started happening to resolve conflict. This is how the cycle goes.

A unity of individuates. You have the competition. You have the expense of that competition coming in. Then negotiations that lead to cooperative solutions to the tensions and conflicts that have arisen. And in the best case scenario, you get a whole new entity at a larger size level. So now we have the first two of those—the bacteria—or, the first three if we count the bacteria as the first level. But the inventions, the nucleated cell, and then the multi-celled creatures. And of course, we are multi-celled creatures.

And the rest of evolution you've learned about in school, the things that form in the sea and come out onto land and the flowers that come out after the dinosaurs and the birds that fly in the air and the things that the mammals that we all know.

And along come humans. And what do we humans do? We go through that cycle for the first time as tribal peoples. We've been through a dozen Ice Ages, mostly as hunter gatherers. And we did some competing with each other. And we eventually started to form the first cities. And the first cities are only now being dug up. They're like 6,000 to 10,000 years ago, and we're finding them up the Orkney Islands in the northern UK and in the Amazon and in Africa, in the Middle East.

All over the world, we're discovering these peaceful settlement cities that didn't have weapons buried there and that didn't have big walls around them necessarily unless it was to protect against animals coming in or whatever. Anyway, these cities were clearly cooperatives. And I believe that their main function was not so much worship, as you see in the literature, but trade.They came together to work out trade agreements and to share information on how to do things.

So we humans have already been through this at that stage where we went from family units and small tribes to building these cooperative cities. But again, just as the first nucleated cell was new on the planet, so were the cities new. And they themselves had to go through their own life cycle.

If you look at a city from an airplane, unless it's been artificially constructed recently, that city has grown from a small entity to a large one and looks just like a cell on a substrate. Whether you're looking by night or day, you can see the nucleus and those pseudopods that stick out from it.

And it's so like a cell under a microscope blown up to that size. So cities are natural entities, far more natural than nation-states, which are line scratch through territories that people live in, the artificial boundaries. So I believe cities, in the long run, will be more viable than nation-states and that we need to work on city-to-city cooperation now.

So anyway the cities being young went into their youthful phase and started building empires. And so at first we had empires actually ruled by emperors. Then we went into the phase of national empires. Now we're in the corporate empire phase. And the biggest corporations are bigger than most governments on earth today.

So here we are having bumped into our planetary limits. And it has, once again, gotten too expensive to do this hostile competition. And we are being called up on a species to build our global family as a peacefully cooperative new entity, that planet-wide humanity. And I do not believe that we'll have a central nucleus because, you see, the nucleus is information storage. And we don't have to have all our information storage in one place any more.

It's not an autocratic government. Your cell is not ruled form the nucleus and so the organs in your body which is the most highly evolved kind of entity we have on the planet now as single entities, none of those organs are in competition with each other. If they would do so then we're in trouble. And of course all the cells are cooperating. And when they don't cooperate anymore, we call it cancer.

So there are some interesting medical analogies to what's going on in our world now. We seem to have an autoimmune disease. Our addiction to fossil fuels is getting us into trouble. There are lots of medical analogies we can make nowadays to the politics and economics of humanity.

Niki Gratrix Absolutely. It's so fascinating. And even something that struck me was even the Internet seems to be pre-done by the bacteria, as well, that the way they originally connected with each other, we've reflected that now in our human activities creating the Internet.

Dr. Elisabet Sahtouris Absolutely. I call it the first worldwide web. And that was the DNA information exchange. And to this day any bacterium on earth—and of course they're still all around, and we are so dependent on them as we'll get into—any bacterium on earth can rub up against another one and open up a passage between them and exchange DNA. It's really original sex because you end up with two beings that now have a different genome because of this trade that went on. So that's a very interesting thing in itself, isn't it?

Niki Gratrix I know. It's absolutely fascinating. One of the things that we learned on the summit, we had one of the great father of functional immunology, Dr. Aristo Vojdani, who's an expert in chemicals and the link between that and autoimmunity. He's on the editorial board of many science journals. And he stated the facts which is that we have about 80,000 chemicals in the environment, 2,000 new ones added each year.

And he was saying he thinks that the average doctor is probably 30 to 50 years behind understanding what the research is showing in the science journals in terms of how these are causal factors with things like fatigue and autoimmunity.

And food sensitivity is exploding apparently because of the chemicals being used. It's not even the inherent food itself. There's a reason. We shouldn't just suddenly be exploding in our reactions to our food. There's a reason for that. And it looks like it should be the chemicals, as well.

And fatigue patients are often, you could consider them as the canaries down the coal mine, that they're the least tolerant among us of this level of toxicity. So their own personal crisis is only a reflection of this global crisis of this power that's concentrated into the hands of the few with a service-to-self mentality. It's command and control hierarchy, survival of the fittest.

And as you mentioned, the corporates are now bigger than even the governments. It's so far from what I would consider that nature could tolerate. How do you see that evolving and what can we do to get away from that? It seems overwhelming.

Dr. Elisabet Sahtouris Yes, we've actually created a kind of perfect storm of crises as humans. And one of the most serious outcomes of that is the fact that we have tipped the planet into moving into a hot age rather than the next Ice Age, which we were due for. And by the way, I think the reason that humans survived a dozen ice ages was because they learned to cooperate with those big mammals.

Imagine us naked two-legged in Europe covered in age, living in caves, dependent on the animals and yet also prey to such animals. I can imagine being a mom in the stone age and saying, "Mrs. Cave Bear, will you come in and sleep in my cave this winter? I promise to keep the kids quiet if you keep them warm." I think all kinds of cooperation developed. And probably women as priestesses perhaps painted those gorgeous animals on the cave walls.

But that was a time when there was communion as well as communication. In fact, communication, which we do through language hadn't been invented when we were communing with those animals. And if you talk to native people today, Canadian hunters and things, they still commune. And they make agreements with animals about killing them. So there is a lot of peaceful cooperation back in our heritage.

But I'm sorry I strayed a bit from what you were saying. The most important thing in medical discoveries, I think, in recent decades is the discovery of the importance and the huge, vast numbers of our gut bacteria. And so here are these critters that have been with us from the very beginning and it turns out that most of the cells that we as giant cellular cooperatives are are the bacteria.

We have about a hundred trillion nucleated cells and then these far, far smaller… Remember a nucleated cell is thousands of times bigger than a single bacterium. So the bacteria in your gut and on your skin add up to a big multiple that's either 10 or 100 times the number of nucleated cells are these bacteria in the gut.

And we've discovered now that 80% of our immune system is run by them which makes sense because they're the first line of defense against anything you put in your body or on your skin. And I have a motto that I don't put anything on my skin that I wouldn't put in my mouth. And I don't put anything in my mouth that my great-grandmother wouldn't have recognized as food.

Niki Gratrix Yes, absolutely. Agreed.

Dr. Elisabet Sahtouris We are discovering that nutrition is far more powerful in many cases than our medications, our drug-based medicine solutions to problems. Not that there aren't any useful drugs, but we must look at nutrition as the most basic thing to try

when someone has a chronic disease. And you mentioned chronic fatigue syndrome, for example, is a good one.

Now, I have friends in the medical profession who are coming to the conclusion that they almost are stopping to prescribe drugs in favor of prescribing nutrition, changes in nutrition. And so I have become totally convinced by the green smoothie as the best food medicine there is because we're built to eat raw foods. And we're built to eat massive amounts of plant foods in comparison with the meat. If we do eat meat that it should be in relatively small quantities. And different people, of course, have different constitutions. And some do better with some meat. And some do better as vegetarians. So and there are humane and planet-wise ways of raising meat. So that's a whole other discussion.

But right now the main thing is that you are so right. We have these thousands and thousands of chemicals that are unregulated mostly in the environment causing damage to our bodies and especially because they are added to our foods or are deeply embedded in our foods.

For example, years ago, at least twenty years ago one of my filmmaker friends from the UK, Herbie Giarday, was in California making a documentary on food and visited a tomato farmer and asked why he was growing those in his kitchen as well as he had a little veggie garden by his house when he had so many in the fields.

And he said, "If you knew what was in every single one of them, you would never buy another canned tomato in your life because we build the toxins into all their cells, as well as spraying them onto the outside." And he was trapped in a system, wanted to get his kids through college. It would have taken him ten years of no income to restore his soils to anything like organic soil.

And so many farmers are trapped in this situation where they have contracts to fulfill to the canned food manufacturers and other people. And then of course we have the chemicals which people like Monsanto have put into all of the food in addition to genetically-modified food. So we're just in really bad, bad trouble in terms of our food supply and our poor gut bacteria. And so we must support all of the ways of doing new diets or going back basically.

I was raised on an organic diet. But we didn't have that word. I'm almost eighty years old, and I grew up in farm country in the Hudson Valley of the United States. And all of the food was grown basically by immigrants. And shopping was going around from the dairy farm that had a cow for us inspected twice a year by a veterinarian so the farmer knew which cows were for which families and could track problems quickly, not that there ever were any.

And then we went to the chicken and egg farm. And then we went to the honey and fruit and cider farm. And my mother grew a lot of veggies. And everybody bartered, and we ate wonderfully well through the second World War when things were rationed. And about the only things we had to buy in shops were bread and getting sugar for canning.

So it was all organic. The sugar was, too, because in those days there were no farm chemicals. There just simply weren't any. And we need to get back to that. We need to get back to healthy ways of growing our food supply.

Niki Gratrix It's so true. Do you think that this, obviously, we can vote and get that by voting with our dollars and our pounds and our euros. This is obviously what this summit is about is obviously to go buy organic, to demand organic, and to have labeling, for example, so that we know when something has, you know the GMO label debacle and we need to support all that.

But do you see a crisis coming? Or do you think, is it possible, that we can by just getting the word out there and awareness, raising awareness, continuing to do things like this, what say you?

Dr. Elisabet Sahtouris Yes. We are in crisis. It's not a crisis coming. We are in crisis. In Germany they call Parkinson's the farmer's disease. It's been traced to the chemicals in the agriculture. And I think that these agricultural chemicals are going to be in the same situation as the cigarette manufacturers were, the companies that make and use these chemicals.

We've got this huge amount of food intolerance, the gluten sensitivity. I honestly I think that comes from, well, there's pretty good evidence it's coming from the GMOs, from modifying the wheats, the grains, that we've been eating. And so I think that these companies will be brought to court. And, of course, they're very, very wealthy. And they can afford the best lawyers. And Monsanto puts its people in and out of the Food and Drug Administration as we well know.

And they argue that if you label GMOs in food, first of all, it implies that there's something wrong with them, which they deny. But their big argument is you're going to make the people, force people, to buy more expensive food if you ask them to buy organic food. And, "We're trying to feed the people of the world who can't afford organic food." I heard the CEO of Monsanto actually say that. "We're doing the world a favor by producing the cheaper food." And they simply will not acknowledge that there's anything wrong with that food. And, of course, there's hugely something wrong with it.

So we have to do something about that. We have to build the lifeboats by building local food sustainability with organic food because at the same time that we have this crisis in our food supply, we also have this crisis of global warming coming on. And thirteen of the biggest twenty cities in the world are at sea level. And their airports and their seaports are all going to go at once. So we must become sustainable.

So what I see as our evolution is local production of healthy food and, by the way, it's at least three years now since the U.N. issued a report, the United Nations issued a report, that the only way to feed the population of earth that's rapidly doubling is through small farms using natural methods. And you would have thought that that would have made huge headlines, just as I thought fifty years ago when we figured out that global warming was happening that that would be big news.

And these things get suppressed because we have an economy that's set up simply to make profits at all costs to humanity. I'm a euro citizen as well as a U.S. citizen and a Greek citizen. And I voted against joining the EU because I knew it would wreck the food sustainability of Greece, the food self-sufficiency that we had. And, of course, it did. We were ordered to cut down lemon and olive trees because Italy and Spain were doing that.

This was in the early 80's. And we were told that we had to grow tomatoes and onions. And two years later, the Dutch were eating Greek onions and the Greeks were eating Dutch onions. The whole EU market was set up to make money hauling food around rather than feeding people sensibly. So we must come to our senses.

We have made our economy subservient to the ecology of planet earth, to nature. And we have to turn that around and fit a healthy economy into the ecology. When we do that, it's what I call an ecosofy, a wise society. Economy is the Greek word for household ("ecos") together with "nomos" which is the rule of the household.

And ecology is the "ecos" (household) together with "logos" which is a design of the household. And of course, household, in Ancient Greek was seen holearchically or fractally as the individual family household, the whole community, the global, and the cosmic. So it's all a household.

And economy is, as I said, the rule of the household, ecology the design of the household and we should never have separated those and then made nature subservient to our economics. And we don't have a science of economics. We use this superficial Darwinian idea that got popularized as the dog-eat-dog world, and we base all of our economic theory on that when we are missing the whole mature part of evolution.

So when I talk to high-level people in the corporate world, I say, "Thank you for globalizing our economy. It was a necessary evolutionary step during our youthful phase of hostilities. That's how we globalize, through wars and through seizing territories and all that. And now I invite you to become the heroes of the next phase, which is when we build true community all over the globe."

So that's what we need. And we need a new story for that because the Darwinian story was like the hero's journey, all that swashbuckling competition. And now we need, as Joseph Campbell, who identified the hero's journey as a prevailing myth on our planet, we have to find a myth that's for the entire planet. And it's the myth of building that friendly cooperative, global community through local communities.

Just as in your body, your whole body cannot be healthy if your cells are unhealthy or if any organ is unhealthy. We have to think that embedded holarchy of individual community, nation, or cities let's say, and planet when we think about how to behave on earth in the future and recognize that local economies are the rock bottom, bottom line health issue.

If the local economies are healthy, we know how to connect with each other. We have the Internet. I hope it will hold through our crises. And we have new ways of producing energy cleanly. The biggest problem in the alternative energy community is that they don't have good enough storage batteries yet. They're over-producing.

And now we have the ocean thermal coming in. We have hydrogen coming in. Hydrogen is a wonderful, clean fuel with which we could fuel the whole economy. M.I.T. study just said we could produce a huge part of our energy with solar and that our solar technology is already up to snuff. We know how to grow food cleanly.

"There is room," he said. "Why do you stay in prison when the door is so wide open? We can start living the future now. And there are a lot of people who are living the future

now by building this local self-sufficiency. It's why I moved here to this little island that's the most remote landmass in all the world, Hawaii, and working on sustainability here.

Niki Gratrix So essentially if you like, the elite at the moment who are running these corporations, they're almost like the breathers who have been burrowing into the bubblers but at some stage they all realize neither can survive unless it's cooperative and empowerment of everybody. So it can't be anything else. And if it doesn't go that direction, we wouldn't survive. And the bacteria have already been through this. They're the evidence. They've laid it out. If the bacteria can do it, we can do it.

Dr. Elisabet Sahtouris That's my line. My line is if bacteria could do it without benefit of brain, what's wrong with us?

Niki Gratrix That's brilliant. Brilliant. So for those of us just, I think, there's quite a lot in the alternative media at the moment about a financial crash. We might have some more pain to go through. There could be some more pain. There's quite a lot of fear out there at the moment about a lot of people talking about dollar crashes and this banking system.

And I don't know if there's going to be pain through that or not. But I think a wonderful analogy that you talk about is the caterpillars or the butterfly analogy. But I would love for you to share that and anything else that you would like to share in terms of giving people hope really and hopefully that we're on a positive timeline.

Dr. Elisabet Sahtouris Yes, well, thanks for mentioning the financial crisis. You know, we've already suffered. Many people have suffered hugely already from the 2008 crash as they did from the 1929 crash. And we're trying to deny that this one is as bad. But it certainly has been for most people, and we're aware now that we have this 99:1 percent spilt in the world and that somehow the conservatives of the world have been talked into supporting the increased wealth at the top that's totally unsustainable.

We've had analyses of human history that told us that civilizations crash when two things happen. One is that they get so rigid that they can't move with change. And the other is the huge division in wealth. And we are now in the biggest wealth gap in history. And the money system that we've evolved is what has supported that growth of wealth at the top.

But one of the ways people should find hope is to know that it's not really money that builds our societies. It's human work. It's the labor that we do. The money is used to get the labor to happen, you see. But it's also become a way that's totally immoral of making rich people richer, totally immoral because, for example, trading people's debts.

Rich people can trade poor people's debts with each other to make more money out of them. They become financial instruments. That is so bad. And thousands of years ago, Jesus threw the money lenders out of the temple and the Jews had ways of forgiving debt every few years and not indebting people as a moral injunction.

And the Islam also said no usury. So the three major world religions all told us 2,000 years ago that this was wrong, that this was immoral. And yet we do it, and many people still call themselves religious even though their religions were totally against this kind of behavior.

So the hope is that even if this financial house of cards collapses, remember that it's our efforts that can get things going and that we are inventing community currencies that make it easier to exchange goods and services. There's no law against them.

And the model I love is right there in those mitochondria in our own cells. They are the bankers of our cellular economies. Every single cell in our bodies is as complex as a large human city. It has about 30,000 recycling centers that are open 24/7 to renew your proteins day and night. And they have, on average, about 1,000 mitochondria, which are issuing this ATP currency, adenosine triphosphate.

It's a currency that's equivalent to a stored value debit card. It's as if you go to this mitochondrial bank. It gives you a stored value debit card with a certain line to spend on it. You spend it into your economy. Then when you come back to the bank and you don't owe them anything much less interest on it and they reload your card and the bankers are regulating how much currency is out there to prevent inflation or deflation from happening. You have to have just the right amount circulating to keep it all going. So you get a new debit line.

It may be a little more. It may be a little less than you had last time. But everything keeps going. And there is no reason why humans cannot have that kind of a currency system. Remember that even investments are investments in what? In human labor producing new things: new ideas, new structures, new mental structures, new information systems. Everything is done by humans, money being the motivator. What if the motivator is wellbeing for us all?

So the butterfly story just says, you know, basically don't step on caterpillars if you want butterflies because what are caterpillars? They're the youthful phase. They are the ones that eat up to 300 times their weight in a single day and are very inquisitive, are bloating themselves, are using up all the resources as fast as they can to compete with each other.

And then they get so bloated they hang themselves up and their skin forms a hard chrysalis. And inside them little tiny stem cells that are called imaginal cells by the biologists because that chrysalis is housing that imago, that's a technical term for that butterfly in metamorphosis. And then they have been stored in the folds of the skin of the caterpillar. And they start to come to life and join up with each other and form that butterfly right as the caterpillar is in meltdown.

And that is a lovely image that we can use to see how our own economy is metamorphosing. That the caterpillar was a necessary step and by the way this first came out through a children's book by Norie Huddle and that's still available called *Butterfly*. You can look it up. And she shows all those little imaginal cells linking up together to form the new lighter on the earth butterfly that comes out of that story.

So we are imaginal cells. We are linking up with each other. And we are building a butterfly world while the big caterpillar is still there trying to save itself. So we are the hope of the future. We need to build the story of the future and to make it as inspirational as the hero's journey was, as exciting. It's ecstasy forming real community. That's where we can come to our full humanity and all we need to do is start living the future we dream of right now.

All we have to do is treat people the way we want people to treat each other and eat the foods that we think people should be eating, take care of our bodies as they should be taken care of. And look at all the things previous generations during that youthful phase did such that it's become obsolete. It's become too expensive. It's become too unpleasant. It's become too immoral. And move into what we want to do.

If one generation doesn't do war anymore because they see it as feudal or immoral or whatever, then it's gone. If one generation doesn't do racism anymore, we've got global family going. So it isn't that difficult. But the fear factor of course is big. And the best antidote to the fear factor I know is if you're not religious and don't believe in an after life because if you do the fear factor goes away with that.

But just biologically to know this is on our agenda. It's been done before. It was done by the bacteria. It was done by the nucleated cells. It was done by the multi-celled creatures. And it's been done by humans before. Every time we have a crisis, we cooperate immediately, 95% to 100% cooperation, 100% when Fukushima hit Japan. It's in us. It's in our proteins. It's not just in our DNA.

Protein is what does all the work in your cell. The DNA is a library of information, but the proteins are the ones who go get the information and get it copied and get it used and build the banks and give out the money and all of those things so I think DNA is in a way been given over press and we need to look more at our proteins and how to keep them healthy, how to feed those gut bacteria the way they need to be fed to put you in top, top condition and full-blown health. So I hope everybody listening to this will realize that there's everything to hope for and nothing to lose by building the future that we really dream of.

Niki Gratrix Dr. Elisabet Sahtouris, thank you so much. Thank you for all the work that you do. Fantastic. I really encourage the audience to read one of Dr. Sahtouris' work. It's fantastic. Where can people find more about you and your work? Would you like to share your website with us?

Dr. Elisabet Sahtouris Sure. My last name Sahtouris.com is my website. And my newest book is the *Gaia's Dance* book. If you just look up *Gaia's Dance* on Amazon, you'll find it as an e-book. And I wish that book could get out to every school teacher because it's a friendly version of this whole story telling us how to live the future based on our wonderful 4 billion year history. So that's what I strongly recommend people do for starters.

And I'm in a number of films and stuff that are on the website. And you can find lots of videos and things like that at YouTube. One of the newest ones is by Luke Rudkowski. And it's called An Evolutionary Biologist Divulges the Secret to Human Coexisting. It has not got my name on it. But if you do Rudkowski, an evolution biologist, you'll find that one. It's about a seven-minute video that you can freely use in meetings, wherever you want, that gives the basic story.

Niki Gratrix: Once again, thank you so much for sharing your time with us. And thank you very much to everybody listening.