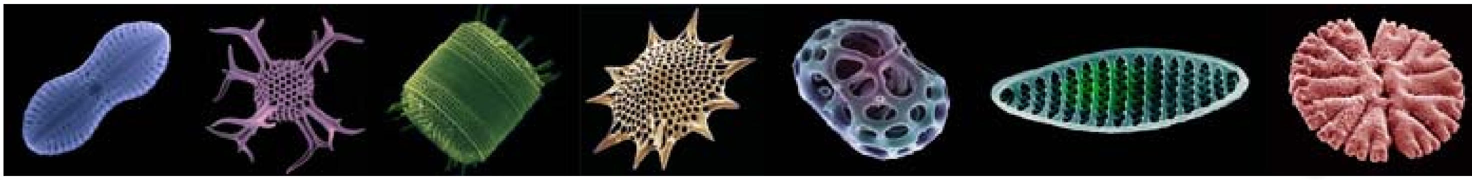
PLANKTOS



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Russ George

David Kubiak:

Let's give a little more drum roll to Russ. Russ has been laboring on this watery frontier for the last 7 or 8 years, and often in the face of great skepticism, in the face of misinformation, and often facing a degree of great hostility. First it was the people who were denying global warming. Why do we need to have responses to global warming? How we can we have a response if it doesn't really exist? Well, thanks to the efforts of many people over a number of years, we are finally coming to terms with what is happening on the planet.

Now the next problem is to try to get people not to turn away from the true enormity of the situation. That is perhaps our biggest challenge at this moment. The more people study about how bad global warming is, the more they are ready to just throw up their hands and say, "well, we just can't do anything, we'll have to adapt, sacrifice Bangladesh and a few islands in the South Pacific."

At this point, the true story is, Kyoto will not do it. All of these wonderful new regulations being proposed in New England and California will not do it. They're not talking about serious enough reductions. And the people who actually look at that think it's an economic disaster zone. Now there are very few people who are willing to wade in there.

Russ George, I believe, is going to be remembered, through history, as someone who took on those challenges and fought off an extraordinary amount of ignorance and disinterest for a lot o time and then this misinformation now that is circulating through the press, or some of the press. But he brings an extraordinary amount of experience and intelligence to this conversatio and I would like for him to share today some of the hopefulness that we are seeing that he has helped create. Anyway, Russ.

Russ George:

Well, it has been a long voyage to get here. I started out my professional life as an environmental scientist. I am from the US. I lived in Canada for a number of years and did environmental management there in Canadian government groups. I, like a lot of government bureaucrats, moved into consulting groups.

A number of years ago when Kyoto was signed, a group of energy corporations came to me and said, "we have to respond and we're going to be required to respond to this energy crisis. How are we going to do it?" And I told them the story of John Martin, a Californian oceanographer of Moss Landing Marine Labs. And how he had discovered the potency of the phytoplankton of the ocean and the role that they had controlling carbon dioxide in the atmosphere.

Ocean phytoplankton are simply a green plant, they are the forest of the ocean. As we all know you can grow a tree, and do good things for the planet by growing a tree. One of which is that a tree will take carbon dioxide out of the atmosphere. A plankton bloom, which is a collection of microscopic or not quite microscopic ocean plants, will do the same thing. They are an ocean forest. And they're in a state of terrific decline. In fact, the whole context of global warming and the problem of burning fossil fuels have focused everybody's attention on that impact and almost no attention has been focused on the ocean. Until about last year or so, finally when the British Royal Society mentioned, in a major report, that the carbon dioxide also dissolves into the surface ocean, and makes it a more acidic ocean.

And so, the other great crisis on this planet, this planet that is 71% ocean that we happen to ca Earth, is that the oceans are dramatically changing and they're declining in health. And so I tol those Canadian energy companies years ago that Jon Martin's Geritol Solution which is taking iron back to the ocean would most likely do as he had said. It would be not only a solution for carbon dioxide in the atmosphere; it would also be a solution for bringing the health of the oceans back. These are pictures of some plankton blooms taken from the satellite resources. Here's a gigantic bloom along the coast of North America. The strait of Wandfuga, Seattle, is just off the right of the frame. Here's another bloom off the coast of Japan. These are very larg features; these are the ocean forests. The interesting thing about ocean plankton blooms is tha they have a life cycle of maybe six months, instead of a life cycle of sixty or hundreds of years, like a forest's.

Ocean plankton blooms are a spectacular feature. They are the source of all life on the planet. Six hundred million years ago there were only bacteria, and then marine plants emerged and produced oxygen and allowed animal life to emerge on this planet. They are now in great decline. Here is the microscopic picture of what they are. These are the ocean plankton. They are free floating un-agglomerated groups. They invented the strategy that herring and anchovies use, which is safety in numbers. If you spread yourself in great masses, a lot of you can be eaten but many of you can survive. That's their strategy for survival. They're also quite beautiful. These spiny and shell like features on them, it's because they are individual plants, and other creatures like to eat them. They grow these hard and spiny coverings, out of calcium carbonate and silica.

The problem today is that the acidity is reaching the point where the solubility of the delicate mineral features that are associated with these ocean plants is very close to the crisis point -- where that material can dissolve faster than it can be formed by these plants. The British Roya Society made a report in the end of 2005, but it came to light last year in the press that ocean acidification was reaching the crisis point. These shelled ocean plants might actually disappea from the planet by the end of this century. The decline of the ocean plankton is so great today that we are in the midst of one of the greatest mass extinctions this planet has ever seen.

Fortunately, these ocean plants are also extremely resilient. They evolved in a system where they could respond with enormous potency at a moment's notice. And that moment's notice is when dust arrives. The critical factor for ocean plants is that they're far from land, the vast majority of the ocean, and they are dependent on the minerals, the micronutrients from dust. S John Martin pointed out that if ocean plants could only have the mineral nutrients they need, they would bloom once again.

These two satellite graphics show declines in iron, in dust deposition from storms. The only are where areas are up in iron dust is downwind of the Sahara, where the desert is getting hotter. I the rest of the world the dust is down dramatically, and the net primary productivity, plant life productivity, is plummeting.

Again, we're downwind of the Sahara and over here in the North Indian Ocean where there are river inflows, kind of like the Mississippi Delta, where there are a lot of agricultural nutrients. Th systemic loss that we all know as a result of the climate ocean plankton is dramatic. Global warming is caused by an annual 6-billion ton surplus of carbon dioxide that has accumulated in the atmosphere. But the ocean's plants have lost 3-4 billion tons of capacity to remove carbon dioxide from the atmosphere due to their dwindling numbers. This is the opportunity for ocean ecosystem restoration that lies waiting out there for us and offering us a chance to heal the earth.

And we intend to deliver part of that through a series of large commercial scale ocean pilot projects driven by the climate change market place, which now allows a healthy trading market for what's called a carbon credit, which is one ton of carbon dioxide equivalent. What we do is we take the carbon dioxide out of the atmosphere by employing ocean plants. We also are involved in very large tree planting projects around the world.

We have a billion tree planting project beginning this spring in the National Park systems of the European Union. That will similarly take a very large amount of carbon dioxide out of the air an sequester it in a healthy living growing ecosystem that has all these important side benefits.

Similarly we will be restoring in the six large pilot projects that we plan, forest size patches of ocean forest that we will be able to develop and extend the research that has been done up to this day. Probably 50 million dollars has been spent in the last 15 years by international science institutes on studying the utility of iron in the ocean as a phytoplankton growth stimulant. And it's really about the missing iron that has gone missing with the dust.

The labeled areas are all the projects that have taken place out at sea. We ran one very small project off of a hundred-year-old Baltic schooner under full sail just east of the Hawaiian Islands in 2002. We had a wonderful feature story in the journal Nature about the work. That's red iron ore, hematite iron, that's trailing out behind the ship under full sail.

And that's what Mother Nature uses, all the minerals, micronutrients that arrive in the ocean come from dust that blows off of the land. And the primary nutrient that arrives there in terms of metals is iron, in the form of red iron oxide, hematite iron ore. So we simply buy our dust, from areas that are closer to iron ore mines than your average patch of dirt. We need to get very high concentrations of iron and the economics make much more sense in that way. But we follow a lot of scientific experiments. This was an experiment that put iron in the mid-North Pacific back in 2002. Here is the coast of North America and up to Alaska. And these are the coastal plankton blooms that grow. And you can see this little patch here where we added iron.

Iron from runoff reaches the coastal water and it doesn't go very far out because the plankton use it all. And it sinks before it gets out to the bulk of the ocean, the larger end. But if you take a bit of iron out, you get a bloom that is identical to a natural bloom. It blooms over the course of days; it sustains itself over the course of months.

Vast quantities of carbon dioxide are scrubbed out of the atmosphere, and turned into ocean plankton. Much of that plankton is eaten and supports the food chain. A substantial part of that sinks to the depths of the ocean and repositions the carbon -- in our case, fossil carbon is what we're after -- repositioned from the surface to the ocean depths. And the ocean, because it doesn't mix vertically except at very slow rates, is happy to store that carbon as a long term deposit it for us, away from the atmosphere and protecting the planet from global warming for hundreds if not thousands of years. So it's a much more secure term deposit than say a forest, which is always in the active ecological biosphere and is subject to being returned to the atmosphere at any moment's time.

It's also a little simpler to do. This is basically the carbon market. Power plants or each of us emit carbon dioxide when we use energy that comes from fossil fuels. Forests take it up, the oceans take it up. The general view is that there's been a kind of a 50/50 split of carbon dioxide going to the land and to the ocean. But that's because we have a terrestrial-centric viewpoint. Probably a much greater percentage goes into the ocean.

Phytoplankton, when they get the dust they need and they bloom, have this terrific effect. For every unit of iron that goes into the ocean, about 94,000 units of carbon dioxide come out as ocean biomass. A very substantial portion of that sinks to depth and is sequestered. And so by restoring iron to the ocean we can produce these blooms and we can measure the effect.

This is a picture of the Weatherbird and this is the kind of sampling that is done. We are not trying to reinvent the wheel. We are just trying to take an extremely well known, mature ocean science methodology that allows us to measure the position of plankton in the ocean at depth. We have work that we can do at sea. We can use satellite technology. The Naval Research Laboratory has recently started to talk to us about helping us with our satellite telemetry and remote sensing work.

We can also launch remote sensors. We are in the process of developing a series of ocean instruments. We like to call them sea satellites, because that is exactly what they do. They are autonomous instruments that float around in the ocean. They orbit within a plankton bloom. They talk to us on our radio satellite cell phone. They autonomously collect data. They rise and fall to great ocean depths by controlling their buoyancy. They can collect data up and down as they're doing that, and they phone home every night with the data stream and ask for new instructions. So it's cookbook science that's very easy to do. These are shots aboard the Weather Bird when she was underway. She comes with the ability to run a fairly well equipped laboratory, and we're just in the process of equipping the Weather Bird with the latest scientific equipment.

We were delighted to run into the Seakeeper's Society recently that is based out of Florida. They really have developed the state of the art autonomous ocean instrument data package. And we're delighted to join the Seakeepers. They're bringing their very fine instrument package aboard the ship and we hope to be able to add to that package. The interesting thing about the Seakeepers is that they have their instruments aboard mega yachts of wealthy individuals and cruise ships around the world.

But this is what we have to do. We have to show where ocean carbon biomass goes. This is a typical view of where carbon goes. So in the short term above 200 meters plankton recycles. But below 200-300 meters you're approaching a hundred year storage time frame, because thi water circulates back to the surface so slowly. Between 500 and 2000 meters you are in a 200-900 year storage system. And down below 2000 meters you are in millennial scale storage So it's not like we need to reach the seabed with the carbon.

We simply need to reposition it at depth, where we have a sufficiently long term deposit for the carbon to buy us time to reduce the global impact of fossil fuels. And that's our business plan, t be able to do that. And the reason we can do that is when we grow ocean plankton in the ocean, on demand, and measure it we get value for it.

We can grow a carbon credit which we can sell on the emerging carbon credit market. It's a very valuable commodity. And today we got word from the Securities Exchange Commission that tomorrow morning at the start of trade Planktos Corporation will have its new stock symbol on the exchange which will be PLKT. And we are raising funds, both in the public marketplace and the institutional banking system, largely from Europe. And of course from a lot of different venture capital-dedicated green investors who are betting that we have the lowest cost, highest volume solution to climate change in the world today. So I guess, questions are appropriate.