The True Life of the Forest
by Silver Donald Cameron

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Dr. Diana Beresford-Kroeger, botanist, medical biochemist, writer and broadcaster, combines medical training with a love of botany. She is an expert on the medicinal, environmental and nutritional properties of trees, and author most recently of The Global Forest. When her parents died, she was raised by an uncle who taught her everything from physics to Buddhism and Gaelic poetry. She was one of only two women to graduate in science from University College Cork in 1963, where she had taken on a "crushing load of studies in classical botany, molecular biology, mathematics, and medical biochemistry".

In the 1950s forests covered 30 per cent of the Earth's surface. By 2005, only 5 per cent remained. When a forest is felled, the hormones from the trees enter the water, and thus enter the animals who drink the water, including us. “Our broken forest,” she writes, “is in our hearts and in our children's tears.”

I thought as I was reading your book, you invoked the figure of the seanchai from your Irish childhood, the figure who travelled from town to town, farm to farm, talking about things that couldn't be seen. It seemed to be your whole book was, in many respects, very Celtic, talking a great deal about things that couldn't be seen but that were nevertheless important and that we should know about.

Yes, I used the trick of the seanchai because in old Ireland, in the old Celtic culture that you also are part of, it was very important in the oral history of your country, Scotland, and mine, to transfer important knowledge from person to person and then from generation to generation. That important knowledge was really kind of a key knowledge for survival, for the survival of the Scottish and the survival of the Irish. All of the things that they needed to have and to know and to remember was tied up in this story of the seanchai. The seanchai in your terms and in my terms was an inherited storyteller, coming from the ancient Brehon system, where the lines of the story are inherited from father to son to son to son, down many generations. And they were used as a mobile advertising, almost a form of Internet, throughout the Celtic system for the movement of knowledge from one system to another and the education of people from one generation to another.

I really thought that this book, The Global Forest, was something that is like a prayerbook of the forest. And I wanted to take very complex science and reduce it down to everyday language, to washing up the dishes, to wiping the table, to the knowledge that is very necessary for all of us to have in our pockets and in our head. I used the trick of the

seanchai, and the seanchai puts in something like: Mise Raifteirí, an file, lán dóchais is grá / le súile gan solas, ciúineas gan crá…

So you would throw that line of poetry into the people and they would all know this poetry, they would all recognize it. And in some of them, it would stir in them a feeling of interest and the interest generated the mind towards what the seanchai had to say. So I wrote it in that form, that the seanchai threw the poetry into the people. Those are the words which are the old words of wisdom that starts each of the 40 essays. And that technique has worked for thousands of years. I thought that technique would work in this book.

CAMERON:

I think it does. It works very beautifully. I was struck by the fact that at several points you talk about the relationship between art and science as ways of perception, as one sometimes leading to the other, and so forth. And it also occurred to me that the seanchai would be talking about things like the unseen world: the world of the fairies, or the world we can't any longer remember, the world within the cool. You were talking about the conversations between plants and the whole interaction between the beings that make up the forest, which we also can't see and generally don't even understand is there.

BERESFORD-KROEGER:

We now belong to the Church of the Holy Dollar. The Church of the Holy Dollar is the church of consumerism. That really swallows people's lives. Their souls are sicked up in this form of consumerism. But we are greater than the product of our whole. We also have our spirit, we have our soul and our mind. The Church of the Holy Dollar does not cater to the spirit and to the mind and to really the arenas of compassion that humankind is greatly endowed with.

Going back to the idea of the seanchai with the spirit, the spiritual world and all of nature. All of nature has a form of spirit, which is something that was understood in the olden times. Today scientifically we understand it and the word is called DNA. The living world has got the double coil of DNA in the genome of each cell, cellular tissue that you have. And each cell of each leaf, each leaf of each forest, of all of the mammals of the world, all of the living creatures of the world. Really we do not know something: We do not know how DNA is played. You can think of DNA as being played like a piano, like Mozart. But the music of Mozart comes from between the notes. It is not the “splash splash splash splash splash”; the music comes between the notes.

All of the living things of this planet that we are living on have that invisible form of a lack of notation. It's almost like black-and-white photography and the negative of black-and-white photography. We don't see it because we see the consumer world. We don't take the time to sit back and meditate in what is around us, and take the solitude of meditation and think about that spiritual world that is there, which is such an important world. Because we are not just a consumer item. We are not just flesh and blood. We are greater than that.

In the old world, and in the aboriginal worlds all across the whole of this planet, they understand that. But we have wiped it out, because right now we have 4.5 billion, half of the population of the world are urbanized. All that they look at is a wall of concrete. All they look at are the streets of the city, the concrete, the flashing lights, and they no

longer see the trees. The other half of the world have some knowledge of the trees, and that is getting increasingly lost. There is a polarity in society where you have on one hand this consumerism, and on the other hand you have this dreadful call for nature. Where we are going, really on the tip of the balance of harmony.

We are about to destroy so many things that hold us in a web of life. Through that, really the thread, the stitching of DNA, we must take that 4.5 billion people out of the cities and stitch the DNA into the trees again. Make them fall in love with nature. Then we will rescue our own souls.

CAMERON:

Our own lives.

BERESFORD-KROEGER:

Well, in many cases, yes. Our own lives.

CAMERON:

I was very struck by the fact that I had never thought of chemistry as a mode of communication. But the book is saturated in that sense of the uses of chemistry to convey information, to receive information, to prompt things to happen. Can you talk a little bit of that web of communication that you describe so well?

BERESFORD-KROEGER:

The natural world uses the mode of chemistry. It's an invisible world of chemistry, chemistry between trees. But indeed there's chemistry between you and I. I hate to tell you, you produce pheromones, I produce pheromones, and right now we are attracted to one another as people. You have your Celtic lineage, I have my Celtic lineage and we actually understand one another. Our DNA in some way is shaped similarly. We do understand one another.

The same thing for the forest. The same thing works for the mammals of the world. But you and I produce pheromones. I have estrogens and all of the estrogen systems and my hormones. You have testosterone and all of the male hormones in your system. The trees have the same thing! The DNA for a tree is very like our DNA, but the manufacturer of their chemistry goes into auxins and abscisic acid. All of these hormones in trees produce growth, produce that huge bulking that takes place for the reception of sun. The one difference between you and I is that you have hemoglobin and your hemoglobin molecule is almost similar to the molecule in the tree that receives the sun. Your hemoglobin molecule has got four pyrrole structures just in a square shape with an atom of iron in the middle, which goes tick-tock into two quantum states.

In the tree the same thing happens! In the tree you have two pyrrole structures with a little tail on it, you have manganese in the centre that goes tick-tock. It receives carbon dioxide out of the air, in the presence of water, and releases oxygen and makes sugar, to bulk up the tree. The chemistry is almost identical. You have serotonin on your synapses; so does the tree. What has happened in life, my great mentor, E. O. Wilson from Harvard, says that we have become unilocular. In science we have taken the minutiae and become unilocular.

What I like to do is to see the big picture. I like to understand the chemistry, the physiology, the biochemistry of you, which I've studied indeed. And the chemistry, physiology and biochemistry of the tree. So if I were to take you into the forest, I see lots of things of the chemistry, of the fragrances, the carrying substances. Which are absolutely fantastic! And we have been missing them all along.

CAMERON:

That is phenomenal. It occurred to me that if you could see what's going on in a forest, it would be a phenomenal site, wouldn't it? If you could see the transmissions and the emanations and so on.

BERESFORD-KROEGER:

Yes! But the birds do and the animals do and the insects do! And it's like X -rays. For us we have radiation from the sun; we have one area of the electromagnetic spectrum and you and I see white light. But there is all kinds of other light: ultraviolet, infrared. In fact, there is a new form of light that is lower down in the electromagnetic spectrum, which is light to the power of 15. That one, they are T-rays. We actually didn't even know that the T-rays existed. They may very well have fundamental, important effects on all of life. We have never even known of their existence. The physicists are busily working on it, but I would suspect that in the next five years, we're going to find some very interesting things popping out of this arena of something we never even knew existed.

It's the application of science to what you know and it is empowering yourself to think like Einstein did. Einstein did all his thought experiments which came up with some of his wife's research, I admit, into EMC^2, into the enormous energy reaction of electron. But in everyday life we have the leaves of the trees receiving carbon dioxide out of the atmosphere, in the presence of that sunlight, and evolving oxygen. That sunlight has fooled us because we thought it came in a straight line. No it doesn't! It comes in a straight line and it also comes in a sine wave. If it lands on the leaf of the tree—and this is what fooled Einstein for a long time, this straight light, we know what that is doing—the sine wave light, we really don't know what that is doing.

Well a tree could have told him. In the leaf of the tree, in any leaf, any green, that sine wave material comes right onto the surface of the chlorophyll molecule and excites the metal in the chlorophyll molecule to tick-tock to the reaction which we call a thermodynamic reaction. A thermodynamic reaction pulls in carbon, bonds the carbon into sugar and evolves oxygen. Your life and my life and all the lives of all the creatures on this planet, depends on that one reaction. And we do not understand it!

CAMERON:

That is a sobering thought. One of the things that struck me as I was reading your book is that I know some of these things, and in a way the book made things kind of click for me. I suddenly realized that you have the whole business of fragrances as a chemical reaction, you have colours.... You said at one

point a tree is a chemical factory. Then you went on to talk about the ways in which the chemicals that it produced created the conditions that it needed for survival and growth.

BERESFORD-KROEGER:

The tree is a mother. Of course you have male and female trees. For the most part you have trees that are female, or trees that have male and female on the tree. But let's pretend that the tree is a mother. That mother looks after her seedlings. Now let's say the butternut, here where we are in Nova Scotia, you have a lot of butternut. And in fact, all kinds of your old furniture was made out of this wonderful butternut that lives here. And the butternut does something very cute. It grows as a tree, it produces juglone, it produces ellagic acid in the growth of the tree, which is a very remarkable thing. The juglone is produced as the tree matures.

And you have a wonderful tree that produces nuts, that has a husk on the nut, which incidentally has never been looked at, chemically, has never been examined from a scientific point of view. Inside you have this wonderful nut that is divided into two. One part of it lands on the ground and the squirrels come along and they bury the nut. But the tree says, “I have so much food, in the area around my roots. Can I afford to have a daughter or a son here in this area?” And if the tree decides that they do not have enough food in the soil, they will produce juglone in the roots. The juglone in the roots murders the seedling. The seedling will not be permitted to grow under the shade of the tree, because the mother must survive.

However, the demand for these nuts is so great by the squirrel population, the squirrel will run off and he will roll the nut into a hole and bury the nut. Roll it in such a way that it is perfect for germination for the radical to go down and the cotyledon to come up, and therefore a forest is made. For this particular butternut itself, in the production of its own being, ellagic acid is produced and it's in the nut itself which

is very attractive to you and to me. That nut itself holds, along with the ellagic acid, oleic, linoleic and linolenic acids, which are the three essential fatty acids for the functioning of the human brain. The aboriginals considered this to be a very important source of food. There was a democracy based on that food. They would crack the nut, eat it because it tasted so sweet to them. And it had ellagic acid in it. Ellagic acid is a protective chemical which protects the whole human body against all of the cancers, which are the breakers of your genome.

They're sly. The trees are sly.

CAMERON:

They are. And that's a lovely example of, in a sense, forcing the children to leave home, and thus to spread the forest itself. One of the things I guess I did know about the forest is that there's a whole set of exchanges that take place between the roots through the fungal system, which is partly communications, partly nutrition. There's a lot of activity.

BERESFORD-KROEGER:

Up to just recently [people] thought, in the scientific world, that a tree is a tree. Now let's forget the Druidic culture, let's forget the aboriginal culture, let's forget all of the people of great wisdom who knew better than this. Let's pretend they don't exist. For us as scientists we thought, a tree grows and then another tree grows, etc. And collectively we call these trees growing a forest.

But there is something else going on in the forest. In the forest floor we have mycorrhizae. And it is really a factory, it's a factory of exchange. It's like an underground

tube-train between trees. The remarkable thing is, with trees like hemlocks, they will grow and then there is a baby hemlock in its shadow. That mother tree seems to know that there is a baby in its shadow and will start feeding carbon through the mycorrhizal system to that baby. If that tree decides that it wants to have a yellow birch next to it, it will then in turn feed a lot more carbon to the yellow birch to pull it up to the top of the canopy. In fact, there is somewhat of a protege system going on in the forest by way of underground feeding.

This is very important for climate change. What it means for the scientific community and the community who are studying atmospheric systems, it means that the carbon is locked underground. When you have a great mycorrhizal system and a forest floor, we have an awful pile of carbon locked underground, with a layer of leaves or leaflets on top of all of that. We have masses of carbon which is selectively being pulled and being re-manufactured by the fungi. Each tree has its own association of specific types of fungi. These will feed to these young trees and then push them up into growth. We never figured that out 10 years ago. Now we know it. Now we know that our carbon dioxide is increasing and we have got to make a judgment about that.

CAMERON:

When we clear cut and demolish the forest and the forest floor, are we releasing the carbon that is locked down there?

BERESFORD-KROEGER:

Clearcutting is an unnatural act of man. The act of the planet for, we will call it “clearcutting” for the time being, is called burning. Where you have a strike of lightning and you get a burn, a natural burn-over. A natural burn-over locks the carbon to some extent in charcoal, surface charcoal, which is reduced down to potassium hydroxide into the soil. And you actually have a form of sterilization, a surface sterilization of the soil, which selectively points certain weeds to grow. We'll call them weeds, certain flowers and plants, depending that they like alkaline conditions. When they grow up, then the neutral conditions first, then the acidic conditions are produced. You have a forest regrowth from that evolving; aspens coming in and then all of the other “take-over” plants that come in.

When you clear cut a forest, you don't give them a chance. When you clear cut a forest you actually eliminate, each tree has got in its possession about 40 insects that are part of the diversity parcel of that tree. Then you have the bird and mammal population. There is an overall destruction. It's like a nuclear bomb going off on the face of the Earth. There is no means by way that the mycorrhizal can continue the apical feeding of the rootlets under the soil. There is no carbon exchange going on. It is like you're cut off at your knees and you expect your feet to walk and to grow. It is an unnatural act.

And in fact, some scientific thought should be given to it. We have the faceless names and nameless faces of the corporations wanting these trees because to the corporate world, these trees are the Church of the Holy Dollar. They're going to make those big boys rich. But they are going to make you and I so much poorer.

CAMERON:

This seems to be a debate that's going on in many parts of the country—certainly, here in Nova Scotia —between the idea that you simply cut on a rotation and you plant a

monoculture. You can't call it a forest, but a plantation of the same types of trees that are good for pulp wood. Every few years you cut them all down and clear cut so that nothing else grows. There is a growing sense around this province, among ordinary people, that this is a vast mistake. But there is great opposition to change.

BERESFORD-KROEGER:

Can I contradict you on this one? This is happening in Canada; I saw it myself on the West Coast last week. It's happening here, to my great disgust. It's happening in Nova Scotia. And I've seen it myself here in Nova Scotia. I walked through a primary forest that is under threat. A forest that no sane scientist would give any form of agreement to this forest near Dalhousie Mountain to be cut.

It's absolutely ridiculous. But it's happening here. It's happening in New Zealand. It's happening in Tasmania. It's happening in Victoria. It's happening in Europe. It is now starting to happen in Russia, in the Taiga area of Russia. It's not just happening here. It's down in Borneo, Borneo has been stripped. Malaysia is being kind of careful. But all of the main continents of the world are being stripped. Also India is being a bit more careful. The floods of Pakistan have occurred because they have already been stripped. In places like Bhutan, they are looking after their forest, but it is happening all over the world.

But let me talk about one thing. This is a faceless name and nameless face. This is globalization at its worst. This is people in the corporate world. It has a pathology about money. The bottom line is the dollar. They multiply and increase and clone and make very large companies that have enormous power. Power over you, power over me, but power over our governments! They are the grey men behind our governments, behind all the government rules all over the world. It is like “I scratch your back and you scratch mine.” But the scratching of the corporate world is a scratching of money, and it's a huge scratch. And they say to you, the last lot of money that is left in the world, is the natural world. We will take all your trees. They will clear cut all of our trees, or lie about it in some cases. Tell the public they want to do this, but in fact they're not. They have a hidden agenda underneath here. This is happening all over the world. This is one reason why climate change is so urgent and it is happening. And they are, in some instances, responsible for climate change.

This mass cutting of the forest, in the global community, for one person on the globe as of today, we have approximately one acre of forest. To oxygenate that one person. You take your oxygen from the forests and the great oceans. We have one acre per person. We should have two to five acres to oxygenate one person because we live in a bell jar. The whole planet is a bell jar. We need that oxygen. I would invite you to stop breathing for the next 20 minutes and see how far you will get in the living process. It doesn't work. They take out our forests, they remove the oxygen for a great number of the people of the planet. This is the dilemma. The dilemma is really not the carbon dioxide! Yes, it is a dilemma—it is a fingerprint of the forest going down, because the forests have this huge thirst for carbon dioxide. They need it to build their great structures. But if there isn't a forest, there is nothing that will feed the carbon dioxide out of the air.

Six hundred million years ago, on the planet, you and I would not live. Because the whole atmosphere was carbon dioxide. It was loaded with carbon dioxide. Every farmer can tell you carbon dioxide in his grainery will kill him, will kill his animals. It would kill you, but at that time we weren't here. The great forests of the world were starting to move into place. And it has taken that 500 to 600 million years to pluck the carbon dioxide, one

atom by one atom, one molecule by one molecule, as carbon dioxide out of the air, into the green leaves of the great world. Into the benthic areas of the ocean. Into the methane of the ocean. Into the great forested areas of the world. Into all of the things that live in the soil. The soil holds lots of carbon. It's a graveyard of carbon. It has made the harmony of life for all of us.

Now we are looking at Easter Island. We are looking at cutting down the trees, eliminating the forest. We are producing Easter Island! On Prince Edward Island, there is one forma of the Ulmus americana [American Elm]. One tree left, of this forma of this tree called the fountainhead, left on the island. So we are going towards Easter Island. What is really happening is that you and I are like bees. I don't know if you've kept bees, but a beehive will go as a buzzy bee, going off foraging for themselves, but the hive acts as a warm-bodied creature. You get all the honey bees back into the hive; they're warm-bodied creatures. We have this funny phenomenon, I'm going back to the chemistry of pheromones, back to the chemical communication between you and I and all the other creatures out there. They function in that way. You and I function as a herd also. Remember we are mammals, and the herd is starting to understand we are in danger. That the greed index out there is putting all of us and our babies, and our babies in the future, into danger. That's what's happening across the world.

CAMERON:

It's fascinating isn't it. You're right. There is this sort of dawning realization that this can't go on this way. One of the numbers that struck me in your writing was that in the 1950s when I was growing up, 25 percent of the Earth's surface was forested. And as of 2005, it was five per cent.

BERESFORD-KROEGER:

We're just losing our forests. And like you said, plantations going in are deserts. I just saw a plantation of Scots pine; it's a desert! There are no birds to be heard in that. And in fact, a plantation of Scots pine should be in Scotland, should be in the Caledonian area, as you know. My little area above Galway is where the Scots pine comes from and the Taiga region in Russia and all of northern Europe. That tree was never meant to be growing here.

So this is a plantation of something that has happened, where the birds will come in on their vast migrations into Nova Scotia. They will come in and the warblers need the essential amino acids out of these trees. And they're not there. The food isn't there. The beneficial insects coming in great number and the beneficial insects need lysine, an essential amino acid for reproduction in the insect world. Our natural forest here supplies lysine. All the honeybees and pollinating bees come in looking for it, and it's not here. Because the forest isn't here. And the flowers of the forest floor aren't here. So we wonder, why are these bees dying? Because we have pesticide-ridden fields and we have no flowers for them to feed on. It's like sending you out into the Gobi Desert and I said, “I would like you to bring me back one gallon of water out of the Gobi Desert.” I don't think that you would succeed.

CAMERON:

Or even five pounds of meat!

Let me take you back to another thing that you describe, which is the savannah, which I guess was the original configuration of the North American landscape in pre-European times. Could you describe that for me?

BERESFORD-KROEGER:

That was the genius of the people living here. The aboriginal world, they had so many extraordinary shaman and so many extraordinary people of wisdom. The great savannah was described by the pilgrims as they came in. And they used all the old English to describe it and they sent the letters home. When they came in on the ship, the pilgrims' Mayflower, they described these “oake” forests. There were the oak forests and the nut forests of the whole area that they had come into. The aboriginal people had designed the grand savannah. And the oak forests and all of the nut forests—I'm talking about shagbark hickories, king nut hickories, black walnuts, were all in this forest and the canopies had stretched across one another. So a squirrel could run across one lot of canopy into another.

It was a very smart thing to do, because we have a 20 per cent higher solar exposure, because of the length and the height of the continent, than any other area on Earth. So we get a lot of sun in North America. These trees require themselves to have a lot of sun. They stretched in these marvellous huge savannahs across the continent. In stretching, they drank the sun because the full green canopy was exposed to the sun. In doing that, they produced the largest amount of nuts and acorns ever possible on a growing tree.

But the aboriginal people did something awfully smart. What they did was a fast, flash-firing in April and another one in November, when the ground was very damp and wet. The flash-firing burnt off all of the so-called weeds, and it produced the potassium hydroxide ash. Ash in water produces potassium hydroxide. And that is the phosphate and the potash element which was re-opened and regenerated for these trees; nut trees require potash. But the potash around a nut tree also reduces predation and disease within the nut itself, within the nut tree itself. So what they did is they had their own fungicidal system going. They had their own system of management of the soil going. They had a system where the trees really become magnificent in their growth.

But that did something else. It increased 100 fold all of the nuts, the acorns, all of the sweet! White acorns, the bur oaks, all of those, all across the continent. It fed the mice, the rats, and the mammals and the bigger mammals, up into the wolves and the bears, and from the bears then into the deer. It increased the deer population by 100 per cent for hunting. So smart.

CAMERON:

So if you had been walking through the forest, it would have been fairly open at the ground. It would have been almost park-like in a sense.

BERESFORD-KROEGER:

Yes and that's where [Humphry] Repton, in early English times got his ideas from, and [Lancelot] “Capability” Brown too. And Repton, for all of the great landlords who owned the woods, or thought they owned the woods, indeed they did cut them down in North America (of course they were living in England). And then they decided they would put in their Reptonial parks and their Capability Brown parks where all of the trees were

like this.

But there was one thing that North America had that England didn't have. We have in all of our trees two compounds called quercetin and quercitron. These are sunscreen compounds within the cambial tissue of the tree. It's in all of the surface skin of the tree. And it is capable of withstanding excessive ultraviolet radiation. That doesn't happen over in England.

CAMERON:

And the result of that is?

BERESFORD-KROEGER: (39:02)

The result of that is more nuts! More harvest, greater harvest. Greater success.

CAMERON:

How did you get such a profound understanding of aboriginal practices and aboriginal life and thought? Because it is woven right through your work.

BERESFORD-KROEGER:

Yes it is. Well I will have to admit something to you. By the time I was 11 years old, I was made an orphan. My family were decimated in a car crash. And on my mother's side, I'm an aristocrat from the old Irish world. On my father's side, I'm an English aristocrat from the Beresfords, which is an old English family from the 12th century.

So what happened to me, I was an orphan. I only discovered this about three years ago: the judge was afraid to put a little girl into a laundry orphanage which was run by nuns, [since] I would be a Beresford, an aristocrat, the granddaughter of Lord William Beresford. I would be washing the underwear and the shirts and the sheets of the city of Cork. And that poor man was afraid to put me there because there might be later repercussions. So he called me into his chambers—this is very unusual and apparently deeply unusual to this day—and he said, “Do you want to go to your aunt, who is in England?” And my aunt was very, very wealthy. Or my uncle, who was a bachelor and was as poor as a church mouse. “So who do you want to go to?” And I said I would rather live with my uncle, because if I went with my aunt I would be a servant in the house. He said, “OK, I've made my decision. You've made my decision for me.” My uncle adopted me, into a wardship. For the next three years, the court case was being sorted out, so I was in a wardship of that time.

My mother's family were Gaelic speakers. My mother's family went into action, and all the 80-year-olds and 90-year-olds in the south of Ireland, near a place called Kealkill, they took me under their wardship in the summers. And it was the wardship of the Brehon system. Ireland in the olden times had a jurisprudence called the Brehon laws. They predate the Magna Carta and the Napoleonic code. I was told all the Druidic culture, all the cures, all the identification of meditation, the alignment of meditation. I was told all of the importance of trees, of nature. I was brought into nature. I was told all of the things that they told me I needed as a woman for my protection, they said, into the new world.

They told me I would be their last child, their last ward, and that I would be the last voice

of the ancient people of Ireland. The ancient Celtic world of Ireland. They told me there would be no more, after me. I would receive this knowledge and I had to carry forth that knowledge. When you're a child, you don't think that's very important. I did think that it was important, but the depth of its importance I didn't understand. These people spoke the Gaelic language and Greek and Latin in their houses. They were very poor. But there were extraordinary spiritual people, very extraordinary people. They never thought it would affect me, and the older that I grow, the bigger the gift that they gave me. They have taken me and they have wrapped me in the Druidic system and in the old system of the old times. And now there are all kinds of strange things emerging to protect me in this system. It is from this system, some of the wisdom that is in that book.

CAMERON:

The world of science must have been very alien for you.

BERESFORD-KROEGER: (43:39)

Oh, I love science. Science is black and white. Science is truth. The search for knowledge, the search for wisdom. The uncle who raised me, really, he was a man of books. He was a scholar; he was an athlete; he was capt. for Ireland for hurling. That's our national game in Ireland. He was a marvellous athlete, but the whole house was lined with books. There were at least 10,000 books in that house. Each evening he would sit on one side of the fire, I'd sit on the other. He'd read physics to me and I'd read chemistry to him. Our Irish poetry back and forth—the classics, all of the old Greek things. To one another.

For all of my life that I knew him, this happened. But he practised two religions. On the outside he was

Catholic and inside the house he was Buddhist. So we did all the Buddhist alignments inside the house. So this is why I'm so confused!

CAMERON:

Or why your outlook is so all embracing! What I was saying was that the way you speak about this is not the way scientists normally speak. I suspect you've had a fair amount of flack from the scientific community.

BERESFORD-KROEGER: (44:56)

Oh yes I have! Just recently, this new book that has just come out on the shelf called Arboretum Borealis: A Lifeline of the Planet, I was asked to address the Assembly of First Nations. Indeed it was a great honour to address them. Absolutely magnificent. There was this huge assembly of people, and all of the children were at the back of this great round table. That gave me the first kind of thumbprint.

Then I was asked to be a keynote speaker at one of the northern universities. I heard them talking about the boreal forest. I heard them talking about cutting 50 per cent of the last great forest of the planet. I thought, “I don't really understand what's going on here.” Weyerhaeuser and all of these big boys were all in the front, and Greenpeace and all of the greens were there in the front. I looked at them and thought, “They're not flinching; did I hear the word 'cutting'? Maybe I'm dreaming.” And then it was repeated, and I thought, “no,no,no.” And I went up to the

microphone and it was open to the floor. I thought, “Well, I'm the keynote so at least I can say something.”

And I said, “No. You can't cut down the boreal forest! This is an act of ethnic cleansing for all of the Cree and the Athabaskan people, all of the northern people of the world. You can't do that!” And as I was speaking, a member of one of the northern nations came up, it was a woman, she came up and stood behind me, took the microphone from my hand and she said to the audience, “This woman speaks with one voice with us.” And you could hear a pin drop.

I went home and I was really beside myself. I thought, “What can I do, to educate the public? To tell them the importance of the boreal forest? Because most of us will never go there. How can I tell them it's so important?” I got the idea of writing a sister book, Arboretum Borealis, which is a sister book to Arboretum America. And writing it in a way that we understand that if that forest comes down, the great whales of the oceans will die. All of the mammals of the sea will go. I wrote that book, but it was at Berkeley. Berkeley was desperate for this book. They didn't want me using the word “sacred.” They told me, “We're talking about science here. Sacred and science do not go together. We do not like the image of sacred and science together.”

So I sat on it for two months. I phoned them up and said, “No, you're not going to compromise my principles. Sacred and science in fact do go together. They have always gone together. I have understood them as a unity from being tutored as a child of 12 about the Druidic system and the Brehon system and the Brehon laws. And you're not going to take that away from me. So even if I have to burn this book, in my wood stove (which I was prepared to do—take a good box of matches and burn it), no, you are not going to tell me what is and what is not sacred.” So that was 11 o'clock. I phoned them and said, “I want the book back.” They said, “We have had patent lawyers looking at this book and there are lots of very important ideas in this book.” And I said, “I guess you've lost them, haven't you? Because there is sacred in science.” And by two o'clock that day I had another publisher.

CAMERON:

Good for you.

BERESFORD-KROEGER:

So you stick to your guns. Yes I have had flack, yes. And that is an example of one piece of flack. They had a reception for me in Berkeley and it turns out that, should I say this, the creationists' money are behind some of these things in the law courts. They wanted to drag me in; they wanted me to give the mathematical reasoning for God, based on fact and mathematics.

And I thought, “No. Your university is full of really smart people. You've got mathematicians; you've got physicists. Drag them out. Let them put their tenure on the counter and see whether they'll stand up with their real ideas. Because I've just done it with my book. Let's see if you boys will stand up for what you believe.” So, there's my flack.

CAMERON:

And so we're waiting.

BERESFORD-KROEGER:

You're right. In that you have to believe in something and you have to stand with what you believe. Science doesn't answer everything. We really need the answers to dark matter, which isn't there. Most of the universe is composed of dark matter. Even Stephen Hawking comes up with all kinds of innovative thinking on the origins of life, but he doesn't really know. He is doing a best guess. We are all doing a best guess. The accuracy of science is yes or no. The accuracy of science is like art. It has its own beauty in a sense. Truth has beauty. And sometimes you run with a hunch and you're right. Sometimes you run with a hunch and you're wrong! But the wrongs are sometimes just as important as the rights. Any scientist who's got any guts, you've got to face yourself sometimes, and for week after week you get negative answers.

Well, so? We can't be pushed by the government. We should have tenure. And we should have our kids looking at research. And we should have a bit more money coming into the research systems. We have too many important questions to be laid out on the carpet for all of us—all of the scientific community and the community in general—to answer these questions. Because we have one big one in front of us and it's called climate change.

CAMERON:

Your sense that the sacred and the scientific are unity: that's always been there in some of the greatest scientists. I think Einstein said that his life's work was to understand the secrets of the old man, you know. Yet somehow that has just been erased from the scientific enterprise for most of what you see.

BERESFORD-KROEGER:

That's right. And Einstein was an extraordinary humanist. As he grew older, his love for the universe expanded at a tremendous rate. These were his thought experiments. He was an extraordinary individual. He could put ideas together, flank them together in physics. His first papers were ignored for a year. Einstein's papers were not even noticed until he became published! Somebody noticed that his ideas were very important. As he grew older, his understanding of the divinity of mathematics expanded.

The universe is based on a mathematical formula. It is in you, it is in me, it is in all things living. We really don't understand that. In the formula of the divine, the sacred, there is that mathematical thread that runs through everything. It is there and we have to push ourselves to understand it. The ancients knew that as the sacred thing, and indeed the sacred thing can be pulled into, in some senses, like a taboo system. Like, for instance, in the old Catholic church in Ireland, the name of Mary, the mother of God is called “Muire.” No female child in Ireland, or in your country, or anywhere is called Muire. It is a sacred word, for a sacred person that we respect in her divinity. She did exist; we respect that. The moniker for Muire is Mary or Maureen, which means “little Mary.” Maire is Mary.

It is sacred thinking, we have to have some sacred thinking and we have to respect the sacredness of thinking in our lives. The Church of the Holy Dollar makes one swipe of that, out of our lives. We can't have that. I don't honestly think that as a human race, we can survive without this, pushing people sometimes, to have respect. Pushing

people sometimes to have compassion, to pull a bit of money out of their pocket and say, “Well yes, children in Africa are dying; AIDS needs research.” We have to have this common humanity. And if we don't have it—through the taboo system of the Muslim world or any religion—we have to be put in the bars of this. Because some of us become too greedy. We become the faceless names and nameless faces of this world that they will not allow you even to have a holiday.

We are thinking beings. We are thinking, creative, extraordinary beings. We have a spirit and a soul. Do we always have to live to the end of our days to gather that small bit of wisdom, to carry into our grave? I don't think so.

CAMERON:

Something else that comes up in your work, that I think is tremendously encouraging: you have some serious thoughts about what individual people can do in the face of what we recognize to be a whole linked set of environmental issues, catastrophes. I'm thinking particularly of things like the bio plan. Tell me about the bio plan.

BERESFORD-KROEGER:

Well you see, I do believe that if we created it, we can fix it. All of us. Not just me. I alone can't fix it. But all of us created it. All of us allowed it to happen. Then all of us will allow it to be fixed. We're all party to the fixing.

With regard to the bio plan, my concept of the bio plan is that if Mary owns a house and she has a husband and her two children, she can, around her house, plant a tree—a native tree to her area. She can plant a native garden around her house. In doing that, all of the Marys of the world will join hands. And the bird populations in the city, in urban areas, will have a tree to land on, a tree to perch on and a tree to feed off.

That's one thing in which we can hold hands. Birds also need other things. Birds need to have sunshine, vitamin D on their skin. They need to actually have a limb to perch on, because the vitamin D on their skin is a deoxy form. It needs some light to land on the bird; it forms a vitamin D and the birds preen themselves. They are ingesting the vitamin D. It goes into their system; it is absolutely necessary for successful egg-laying. Without it, you will not have viable eggs. So Mary has done something by having her tree. As a matter of fact, let me sidestep for one second. You and I need vitamin D. You and I need to expose our skin to the sun for 15 minutes or so every day to have our vitamin D. Without it we too will not have our health. Most people shower three to five times a day, washing the vitamin D off their skin, thinking they're going to be healthy. So there is another little kind of sidetrack.

Back to the bio plan. The farming community is on its knees. It desperately needs help. Farmers are, of all peoples of the Earth, they are the ones most capable and most able to grow things. So are the foresters, but I'm speaking about the farmers right now. There is a lot of vacant land in Canada, I know, and in the rest of the world. If the farmer worked to put in an area of, let's say, five acres of trees on their farm, then they are adding to the de-carbondioxidation of the planet. So that is one way of carbon sequestration.

But the farmer can do something else. He can maybe, in his farm, put up one black walnut. I will talk for Canada, for the Thomas type, so it's Juglans nigra, “Thomas.” That black walnut, if it's looked after properly, will grow in his lifetime to produce

enough money for his children's education. It will be sold at auction for about $60,000, because there isn't enough black walnut in the world for veneer. It forms a black wood. Everybody, all the designers are looking for this. There is an enormous demand for black walnut, for the nuts themselves, for the shells actually, for a form of sandblasting, for the wood itself. So one tree, maybe he puts in 20. One tree, if it's looked after, will beat any mutual funds he has in the bank. We start with that.

Then, let's say, he lives in the calcareous area and he wants to put in, maybe, five acres of some mixed oak with other things. The white oak here.... With climate change increasing, there are more wines. Everybody is growing wine. We're all drinking a bit more (maybe you and I are not. Maybe we're being perfect and drinking tea). But the farmer can sell some or all, or put aside some of the white oak for casks, for actually handling wine and handling whiskeys. We're importing our own oak right now.

We're importing the oak for our wine industry. We are screaming for oak. We are cutting down oak where it shouldn't be cut. So why can't we say to our farmers: “You grow some, we will guarantee your price,” and it goes into the general market?

There's another problem I have in the bio plan. If you and I are going to continue to use paper, we must find an alternative for the tracheid. This is where Canada is all-important. They are slow growing in Canada. From the south to the north, the wood is very slow growing. But that produces an excellent tracheid in the wood. That excellent, tough tracheid is what makes the best paper in the world. What I say is, you get the farmer to grow five acres of hemp. This was part of an experiment a number of years ago. You design a machine for baling that hemp. But the machine has to have polar compounds going through it to wash off the hemp to some extent so it can be baled. This is very simple from an engineering point of view. Bale the hemp, send it to your timber mills. And make paper out of it! It grows on nothing. It grows without fertilizer. More importantly, it grows without pesticides. It will grow extremely tall. And then have a co-operative market for hemp. Get the hemp into the mills and get the mills retting it for paper.

Then if you want to have an eternal form of paper, get all of the bark off the basswoods that are being cut. Boil that bark, which is not difficult to do from an engineering point of view. It becomes super-strong bark, like steel. Put that in with it and then you have eternal paper. A paper that can be recycled continuously. Maybe it could be used for 20 uses. But let us use our heads! We don't have to cut down the forest to make paper! We have to attend to the farmers. We have to attend to other things if we're going to live in some form of harmony. We can use our brains for these things.

CAMERON:

The bio plan, as you perceive it, has this community dimension where it involves the farmers and the paper mills. But it's also very personal; it's Mary and her tree and the local birds. You also see it as having a way of developing corridors for wildlife and bird life as they migrate. So that my little piece of bio-planned land is continuous with yours and so on.

BERESFORD-KROEGER:

Exactly. It's very simple. It's just so simple, you wonder, “Why didn't I think about it before now?” And really it develops community. If we're going to deal

with climate change, one thing we are going to have to have is community. Where I live around Ottawa, there is no community left. But we have to generate more community. Even if there is some catastrophe of some kind—I'm talking about, maybe, the avian flu coming and returning and re-mutating, the retroviruses redoing their system, because they are capable of gene injections. If we do have something like this happening—or maybe super-toxic tides is another one, with neurotoxins running on them—we do need to have a community. I do need to know about you as a neighbour. Even if I might fight like blazes with you, I need to know who you are. It is very important.

CAMERON:

One of the things that has come up in one after another of these interviews, is exactly the point you're making, that we cannot resolve these problems as individuals. We can only resolve them as communities, as countries and as human beings working together around the world. There is no individual fix for any of this.

BERESFORD-KROEGER:

Yes. As a matter of fact, we need to do one more thing, I think. I really don't talk about it a lot in The Global Forest. We need to be rich in what we do not want. We need to start thinking that way. We do not, as a society, have the money to buy garbage. We have to start looking at quality. Looking at quality brings the artisans back into our lives, bringing the beauty of all of their fine works. My grandfather, apparently, had a pair of shoes made for him on a last, that lasted 25 years. Why can't we have something like this again? Working shoes, decent clothes, handmade clothes? I mean, that is one thing, can we be rich in what we do not want?

Another thing we can do is maybe go vegetarian two days a week. We have absolutely extraordinary cookbooks out there. We can make delicious food. We have the multicultural aspect of the whole world now—Indian food, all the foods from all over the world. We can learn from all these cultures and produce absolutely gorgeous dishes, with maybe a salad on the side. There is nothing wrong with that. Two days a week. That reduces the use of beef in the world.

CAMERON:

It's such a simple idea, but such a powerful one. That you don't have to become vegetarian universally, that you can do it two days a week. And that makes a huge difference. And it's not painful.

BERESFORD-KROEGER:

No. In fact it might fatten you up! Because some of these wonderful cookbooks that are out there, we have all kinds of spices that we've never had before. I remember as a child in Ireland, walking down the street and looking in the grocery store and seeing a pepper for the first time. And it was displayed as an item in the grocery store, as an item all by itself, on this little vase that held it up.

I remember standing in front of it and looking up and thinking, “Oh my! That must be a pepper.” I've harvested all of my peppers out of the garden this year. We are more rich in all of the things we know how to grow. And all we have to do is do it. All we have to do is just tumble them together. And the men know how to cook now. So there's a little bit of blackmail you can use in the household. You can get very tired as a woman one

night and say, “Well, OK, take the pots and pans out and do it.” It becomes fun, is what I'm saying, in a living situation, to do that and also to have natural products around the home.

This is something that really worries me quite a bit. This bisphenol scare is actually just the tip of the iceberg. In a lot of the modern synthetics that we have, they are gassing off all the time. The gassing off material within the home is happening with dishwashers for instance. The dishwashers are humidifying the air and aiding the gassing off of synthetic compounds into the air, which is really not very good for children. As children are very young, they have a very high metabolic rate and they will actually take in a lot of these bisphenol compounds into their bodies. It is a molecular toxin, a molecular pesticide for children. It is something that, as they grow older, their immune system is weakened by this. It becomes maybe a possible form of cancer or some other dreaded form of disease for them.

CAMERON:

Diana, this has been absolutely wonderful. I really appreciate that you were able to come and be with us. I was hoping before we wrap it up, I could get you to read a little bit from the book for us.

BERESFORD-KROEGER:

It would be my delight to do that.

BERESFORD-KROEGER: [reads pp. 4-5, The Global Forest.]

This drifter was the seanchai, or traditional storyteller. He was the keeper of legends and oral traditions of his Irish brethren. These were passed down within his family lines to share with all who would hear. He was the living memory bank of his race...“he was the one!” The seanchai was the most important visitor to the farmhouse. All else came after him in the pecking order. His voice held the mysteries of life itself and his riddles encased them in that ancient throne of Gaelic wisdom.

When he was fed and settled by the turf fire, the hills emptied to his heels. The local farmers came smelling of sweet hay and freshening cows with rod and perch in their brains. The mountain people came through the half-door with a windy billow of an Irish poem. They all came. They always stayed because the night, that night, would be so sweet.

The Seanchai began like a wet dog, rounding his backside in the three -time circle of the wolf. He threw his idea as a refrain into the flames for it to float around, to be chewed upon, to be thought about and finally to be digested. The idea was always short, sometimes in Gaelic, sometimes not. The words were carefully fed out, as the backside settled into its stride, forming the short refrain. This piece was passed along from person to person in the wonder of itself like an echo of the past into its own domain. And then the story began.

And so, each one of my stories is presented to you first as a refrain. This is for thought. Ideas are the food of the mind. Thoughts and ideas beget curiosity. Then my story begins. There are forty of them. Each is in essay form. Combined, they are called The Global Forest. Each leaf of every tree makes up the global forest. This forest is the environment that drives and fulfils the dream of each leaf in a vast rhythmic cycle called life. Nothing is

outside. We are all of it in a unity that transcends the whole. Maybe, just maybe, this resonates of God. If that is so, then we are all His children, every earthworm, every virus, mammal, fish and whale, every fern, every tree, every man, woman, and child. One equal to another. Again and again.

CAMERON:

Lovely. Thank you so much. May I ask you for one more?

BERESFORD-KROEGER:

Yes, you may.

CAMERON:

This is one I just thought was such a beautiful little description. It's only a paragraph, but I thought it was a stunning piece of writing.

BERESFORD-KROEGER: [reads pp. 24-25, The Global Forest.]

She walked out of the kitchen door, closing it against the lullaby of a little life. She quickly passed the perennial border to her left, glancing at it while she pulled on each glove. The flowers were opening their petals in a yawn of fragrance, getting ready for the business of bees. A stray moth moved like a mote of pleasure. The spiderwebs gleamed with tiny gems of crystalline water in catchment caves near the rich earth. The line of espaliered apples pointed the way to the trees of the forest.

CAMERON:

The remarkable Diana Beresford-Kroeger. After listening to her and reading her, I suspect that every one of us will have a fresh, rich view of the extraordinary complexity of the many lives of the living forest. If you found this interview stimulating, I suspect you'll also enjoy our interview with Bridget Stutchbury on the songbirds which are such a glorious feature of forest life. And also our interview with Satish Kumar, the Anglo-Indian editor, philosopher and advocate of what he calls reverential ecology. For the Green Interview, I'm Silver Donald Cameron. See you next time