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Mission Biotech

Roberta Bondar signs on as Canada's first national biotechnology champion

By Catherine Muir

Say the name Roberta Bondar to practically any Canadian, and they immediately think of one thing: outer space. That's because in 1992 Dr. Roberta Bondar became the first Canadian woman to travel in space.

Since then Bondar has become known for many other things: her photography, her medical research, and her educational speaking. And now she's wearing a new hat. It's a role BIOTECanada hopes will reach people of all ages across the country. This spring, the national biotech industry organization named Bondar its first National Champion, in charge of promoting knowledge about biotechnology in Canada.

Bondar seems an unlikely choice at first glance. What does biotechnology have to do with outer space? But a closer look at Bondar's life reveals an extensive background in agriculture, pathology, and neurology, complete with a Ph.D. in neurobiology and a medical degree—all of which led up to her space flight (during which she studied how living organisms reacted to and behaved in the space environment). Ultimately this long list of accomplishments makes her the perfect choice for biotechnology and BIOTECanada spokesperson.

"I would love people to look at the natural world around us and see it differently," Bondar says of her goals as national champion. "A lot of people think we're on a shelf, not a planet. A

Photo by Christopher Campbell

planet is continually evolving and to me biotechnology means that we are actually trying to use and learn from what's out there.

BIOTECanada started the National Champion Program this year with the hopes of engaging Canadians and broadening the dialogue about biotechnology and its potential. "This program is designed to grow Canadian awareness of biotechnology in all of its applications and showcase world-class Canadian leadership in technology improving our daily lives," says Peter Brenders, president and CEO of BIOTECanada.

Bondar is not unaware of the challenges behind this latest mission. "When a lot of people think of biotechnology, they think of cloned animals. People think about biotech from a negative standpoint because quite often the press talks about biotech as impairing, rather than improving, our society."

"Discovery is vital to the Canadian dynamic of who we are and what we can achieve."

Always a scientist at heart, Bondar sees the other side of the story: "As we progress further into the 21st century, adapting to new technologies and embracing their capacity to improve our lives is vital. For our health, for our environment, for our general well being, biotechnology has a lot to offer," she says.

"The fact that there are people who see the connections between the natural environment and how it can change things to benefit humankind is really quite a gift of the human mind itself," says Bondar.

Bondar's interest in the life sciences began at an early age. Although mainly interested in space as a child—she was building model rockets in elementary school—Bondar also found time to look at the natural world around her. In high school, she worked summers at the local "bug lab" run by the Department of Fisheries and Forestry, looking at the spruce budworm. It was through this job that she realized the potential for a career in science. She was convinced by scientists in the department to study biology at the University of Guelph, which she did, adding zoology and agriculture to the mix.

Bioscience 101 Education Session

PEI's Bioscience Cluster will host Bioscience 101 Education session, an open seminar/education session for high school biology teachers and students to introduce and expand their awareness of bioscience. A series of seminars will highlight the various academic, private and public sector institutions involved in the biotech sector. Included will be tours of research facilities and hands-on demos.

Date: September 25-26
Location: Charlottetown, PEI
Website: www.peibioalliance.com

Bondar remembers reading Rachel Carson's 1962 book *Silent Spring* while at university. The famous book discusses the detrimental effects of pesticides on the environment and the importance of sustainable development. Indeed it raised in Bondar the idea of selecting organisms that have resistance to certain subtances. "I started to think about manipulation of the natural environment. Early on I was looking at how the natural environment can be used to teach us things."

At Guelph, Bondar says she was also exposed to the idea of changing plants for the benefit of humankind. "I remember one of the professors coming in and sticking a plastic corn plant in front of us. It was supposed to be the perfect corn plant: [for example] it showed the angle that the leaves would have to be at in order to get the perfect amount of sunlight and be the best that it could be. That never left me."

She went on to earn a Master's degree from the University of Western Ontario in experimental pathology, researching the heart. That was followed by a Ph.D. at the University of Toronto in neurobiology, and subsequently a medical degree with a special interest in space medicine from McMaster. Bondar did postgraduate training in Toronto, London, and Boston, before becoming an assistant professor of medicine in neurology at McMaster, where she also directed the multiple sclerosis clinic.

When the opportunity came for Canadians to be able to go into space, Bondar—an adventurer in spirit—jumped at the chance. She met all the qualifications and became one of the six original Canadian astronauts selected by NASA in December 1983. In 1990, she was chosen as a payload specialist for an upcoming mission, and she flew on Discovery during Mission STS-42 in 1992.

During the latter mission, Bondar and a colleague were in charge of life sciences and materials experiments in the first International Microgravity Lab. The focus of the lab was on how humans, animals, plants, and materials reacted to and behaved in the space environment, faced with microgravity and cosmic radiation. Roberta and Ulf Merbold planted seedlings of Canadian wheat and oats in the Biorack in an effort to find and develop efficient strains of plants that would cope with less than optimum conditions. They also monitored fruit flies, mouse kidney cells, frogs' eggs and sperm, and slime mould.

Some of the science experiments leveraged her own body, looking at balance and disorientation in space, and energy expenditure of the astronauts themselves. But Bondar was most excited about a medical experiment developed by her U.S.-Canadian research team to study blood flow to the brain of the astronauts on board.

In 1992, after returning from space, Bondar resigned from the Canadian Astronaut Program to head up an international medical research team at NASA studying the effects of short- and long-term space flight on astronauts from 24 missions over six years.

In the years since her space flight, Bondar devotes her energy to research, photography, writing, and public speaking. She published three books, including the 1994 publication *Touching the Earth*, a book about her space experiences and environmental concerns.

Among her numerous commendations, Bondar has been honoured as a Fellow of the Royal Society of Canada, inducted into the Canadian Medical Hall of Fame for her pioneering research in space medicine, and recognized with the Order of Canada and the NASA Space Medal. In addition, she has received 24 honorary doctorates from Canadian and American universities.

Bondar sees her recent BIOTECanada post as the chance to be both educator and motivator. "There should be a greater presence in the Canadian mind about what these things are that we can create and what they mean to us. It is important to teach children, first of all, to understand the concept of biotechnology, and then to understand what the applications are," she says, adding she wants to encourage kids to see possibilities for biotech-related careers in business or science.

"I don't think there is one area that biotechnology does not touch."

Bondar especially wants to encourage people to see how biotechnology can help in our daily lives, especially in solving problems affecting humanity globally.

"The idea of having a better yielding crop is very attractive when we are trying to feed people all over the world and make plant-based products that are better for us. We have much more available now to change plants in terms of genetics."

She also sees possibilities in biotechnology for improvement of conditions in third-world countries. "Looking at Africa and AIDS or smallpox, or new strains of TB—we have to start developing and looking at using the natural world around us as a way of coping with these things."

As a woman involved with biotechnology research, Bondar also sees her new role as trying to showcase biotech-related work as an attractive profession to both genders.

"In the past, technology has been a male-dominated profession. One of the things that biology has always had is a huge following for both genders," says Bondar. She sees biotechnology as a way to combine the two in gender representation as well as in science. "I don't think it's as difficult for women to make that leap as it is if you took biology out of that equation and it was just technology. Because I'm a woman and I'm up here, maybe young girls might [be inspired]."

A more timely aspiration for Bondar and BIOTECanada's purpose in the National Champion program is to spark discussion regarding changes at the national level. Bondar feels that in addition to educating those who are not in the biotech industry, "we need to educate political leaders, bankers, and lawmakers—and to establish an environment where there will be policies made and money available to make Canada the world leader it can be in biotechnology. I don't think we're quite there yet."

As an environmentalist and self-described "passionate earthling"—it's actually on her business card—Bondar also places a lot of emphasis on ethics. "When we look at biotechnology, there are the ethics of the development of it, of the use of it, and the misuse of it. Unfortunately, there are people in society who are going to try to do something [bad] with whatever is being created. And as human beings we need to protect our society from those mishaps. We need to have policies and legal guidelines in Canadian biotech."

Bondar laughs when she talks about why she was chosen to helm this latest mission for BIOTECanada. "I think people will look at me and say 'she's an honest soul—like a squeaky clean aunt—I wonder why she is fascinated with it'. " But it's a big role, and Bondar is also aware of her recognition in society and the weight that might carry. "I have a profile and I take that very seriously." BB