



F O R A G E N VISIONS

PerOs Systems Technologies Inc.: *Reinventing Animal Vaccination!*

INDUSTRY PROFILE

It requires considerable dexterity to trap a fish with bare hands. Imagine grabbing a young salmon weighing about 40g (1 oz.) and then injecting it with a vaccine using a syringe and needle. Repeat the process a thousand times! The challenge is prohibitive but this is a reality most fish farmers face on a regular basis.

Serious infections can decimate a fish population within a few weeks. Diseases such as furunculosis¹ and vibriosis², which occur mainly in fish in the salmon and trout family and were previously only treatable with antibiotics, can now be eliminated through the use of efficient vaccines. In Norway for example, all farm-raised salmon are systematically vaccinated to control disease. While vaccines are effective, administering the product by injection can cause damage through stress and injection site trauma. Vaccines are difficult to administer, cause financial loss through damaged fish, and add significant labour expense to production costs.



Dr. Grant Vandenberg Ph.D



Denis Bernier

Responsive science

PerOs Systems Technologies Inc. is a young company based in Saint-Nicolas, near Quebec City. PerOs, in response to a need for less labour intensive and lower risk disease prevention, developed a new approach to vaccinating monogastric³ animals such as fish. The idea was to vaccinate fish simply by feeding them! The concept was simple but putting it into practice

was a difficult task. Previously, researchers who studied the possibility for years came up with nothing but fish stories. It took imagination and scientific expertise to devise a recipe for an edible vaccine. This new product, OralJect™ is delivered as fish feed. When consumed, it passes through the stomach undigested and remains intact inside an organism protecting it from disease. The formula incorporates a variety of naturally occurring products that increase the permeability of the intestinal wall. The vaccine protein can then be delivered into the blood while preserving its bioactivity.

Breakthrough technology

Murray McLaughlin, president and CEO of Foragen says, “The technological platform developed by PerOs represents a major breakthrough in animal health.

foragen

It streamlines vaccine delivery to a greater number of fish species.” The OralJect™ formula is packaged as a conventional feed product and is fed once or twice to a fish population. This technology offers many competitive advantages:

- dramatic reduction in mortality rates associated with vaccination;
- elimination of the tissue necrosis that often occurs at the injection site;
- possibility of vaccination at different stages of the fish growth cycle;
- option to give booster doses.
- ability to customize dosage based on fish size

The OralJect™ technology is not limited to vaccines and also serves as a delivery system for other bioactive compounds.

Market demand

A dramatic drop in the populations of many species, due in part to commercial overfishing, has increased development of marine and freshwater aquaculture worldwide. With annual growth of over 11% since 1984 and exports exceeding \$53.5 billion US in 1999, aquaculture is growing at a speed that clearly surpasses other forms of stock production. Large-scale cultivation of shrimp, oysters, mussels and seaweed is ongoing, but the most important type of aquaculture for sheer volume is still fish farming (pisciculture). All types of pisciculture are vulnerable to disease and parasites. A number of academic and industrial research centres are working diligently to

develop new vaccines against these infections for various fish species. To encourage the development of the marine fish-farming industry for species other than salmonids, it is essential to develop effective strategies to manage infectious diseases. Grant Vandenberg, Ph.D, inventor and co-founder of the PerOs Systems Technologies, met this challenge with gusto. The resulting technology, OralJect™, is set to revolutionize the aquacultural vaccination industry. PerOs technology will allow wide spread application of vaccines to fish farmed in tanks, lakes and seas.

Investor commitment

The founding of PerOs was possible in part because the Centre Québécois de la valorisation de la biomasse (CQVB) provided seed capital. “This advance funding was invaluable to the company in completing its proof of concept and strategic development plan,” according to Roger Bernier, Foragen Vice President for Québec and the Atlantic region, and chairman of the board of PerOs. Foragen was the next partner to become involved. “We brought in the bio-innovation fund, raising a first round of financing for a total investment of \$2.4 million.”

Foragen and CQVB works with PerOs senior management to develop and market its technology. PerOs’ board of directors includes top experts in the production and marketing of animal health products. A scientific advisory committee supports the work of the board of directors and PerOs executives. Dr. Vandenberg’s scientific reputation attracted international-calibre researchers to the scientific

advisory committee. These individuals work closely with PerOs thus enhancing its scientific and technological expertise.

Strategic development

PerOs recently signed strategic marketing agreements with two multinational corporations working in animal health and aquaculture. Together they will fine-tune the proof of concept and begin marketing OralJect ‘ vaccine with a focus on salmon and trout. The company has also signed research and development partnerships in other development sectors within aquaculture industry. Denis Bernier, PerOs president and CEO, expects the company to post its first sales within the next 18 months.

Although PerOs is currently devoting efforts almost exclusively to pisciculture, the company has carried out conclusive testing on several animal models, particularly pigs. Applications for other monogastric animals are anticipated and will be incorporated into a development and marketing plan at the appropriate time. For more information about PerOs, please visit the company Web site at

www.perosbio.com

¹ a bacterial disease that is usually characterized by boils on the skin of the affected fish. It travels through the bloodstream and affects all parts of the body, especially the vital organs. Untreated it is always fatal.

² a systemic bacterial infection causing skin ulcers or septicemia characterized by hemorrhaging and anemia.

³ having a single stomach

President's Message



Dr. Murray McLaughlin PhD, P.Ag.

As President of a national venture fund I am privileged to work in an environment that delivers a constant stream of stimulating ideas and concepts. At a recent meeting I had the opportunity to meet with a venture group from Anchorage, Alaska, KONIAG.

During the meeting they showed us a book written about their people and region titled, "Looking Both Ways." The title struck me as significant. I equated "Looking Both Ways" to the role of the Foragen Team and our diligence process. We take great care to understand the development process that generated the technology, the concept: of the

people involved, and the strengths they bring to the company. Exploring these aspects helps us visualize a realistic future for the technology, and the potential for the project. By offering appropriate support we can help realize the future for our investments: real people, real companies, real futures.

PerOs Systems Technologies Inc., the company featured in this month's issue, demonstrates the possibilities that emerge when individuals like Denis Bernier and Dr. Grant Vandenberg identify an emerging need for a non-intrusive vaccination process. They bring their solutions to the fish farming industry as a practical application for a growing industry. Real people creating a real company with a vision for broader applications in the future.

It's not easy for us to pick out the company creating technologies when dealing with seed and pre-seed technologies. However, it is particularly satisfying to note that over

the past three years we have created 12 investments that I believe give Foragen a solid portfolio. As we help to move these investments forward, building the technology and management teams, I can see success.

Murray McLaughlin Ph.D.
President & CEO
Foragen Technologies
Management Inc.

Footnote

"Looking Both Ways" was written by staff of Smithsonian Institution and Alutiiq Museum and Archeological Repository (Kodiak, Alaska). The editors are Dr. Aron Crowell, PhD, with Smithsonian; Amy Steffan, Alutiiq Museum and Dr. Gordon Pullar, PhD, University of Alaska. It was published in January 2000.

"The people who get on in this world are the people who get up and look for the circumstances they want and if they can't find them, make them."

George Bernard Shaw

The Partners: Visualizing the Future

At Foragen Technologies Management Inc. we manage a \$42 million investment fund dedicated to advanced agricultural technologies. Three investors, RBC Technology Ventures Inc., Crown Investments Corporation (Saskatchewan), and SGF-SOQUIA (Quebec), were brought together with the belief that agriculture based innovation would be a significant opportunity for the 21st century.



CROWN INVESTMENTS
CORPORATION OF
SASKATCHEWAN

When the investing partners selected their venture team, they looked to the agricultural biotechnology community as a source for experienced innovation specialists. Each of the individuals selected for the team demonstrated a shared commitment to the advancement of agriculture and food technologies.



Since its formation, the Foragen management team has enjoyed the confidence of the joint venture partners. The investors and the Foragen team have a shared vision: to see good agriculture technologies developed and commercialized. With mutual support, the company forged agreements for 12 important investments in the agriculture and



agri-food sector. The investors and the team believe these endeavors will add economic benefit to the industry.

"No man can act with effect who do not act in concert; no man can act in concert who do not act with confidence; no man can act with confidence who are not bound together with common opinions, common affections, and common interests."

Edmund Burke, 18th century British Statesman

Foragen Management Profile **Roger Laurent Bernier, Vice-President, Quebec and the Atlantic Region**



Roger Laurent Bernier, Ph.D., P.Ag.

Roger Laurent Bernier has spent his entire career working in high technology, almost exclusively in the agri-food industry. According to Roger, "I started out as a microbiologist at C-I-L in their pulp and paper division. At the time, I was in charge of an international R&D team responsible for the development and marketing of new biopesticides to control destructive insects in forestry and agriculture. As a result, I was able to take part in all phases of new product development from the laboratory through commercialization, including intellectual property protection, field testing, and

licensing." Following the acquisition of C-I-L by the multinational ICI Plc, he went on to work on numerous other projects that led to the commercialization of other biotechnological products and processes. "The years I spent in the industry were good preparation for the position I now occupy on the Foragen team," Roger explains. "Because I am very familiar with all phases of product development, I can help new teams face the many challenges associated with bringing new biotechnology products to the market."

In 1996, he left the field of industrial research to begin a second career at a high-tech business incubator in the Montreal area. As vice-president of biosciences for Inno-Centre, he was responsible for recruiting and mentoring business start-ups in the biotechnology industry. This work led him to develop new expertise in the areas of financing and commercial law, human resources management,

and the formation of sales and marketing teams. Today, he puts his expertise and skills to work for businesses financed by Foragen throughout Eastern Canada. Dr. H el ene Chiasson, Vice President, R&D at Codena, a Quebec-based company operating in the natural pesticides industry and financed by Foragen, is pleased to work with Roger. "Roger has a highly practical knowledge of the biopesticide industry that has proved invaluable on numerous occasions," she states. "He has a good understanding of all the development phases of these products, which makes him well-qualified to help us identify and solve problems more effectively." Roger applies the same savoir-faire to business development at PerOs.

