



THE PHAGE INDUSTRY NEWS LETTER



The Renewal of Bacteriophages and their Industrial Applications

One of the first phage products, ListShield™, for meat decontamination has been recently introduced by Intralytix, Inc. in North America. Such an example demonstrates how phages are about to become essential for biotechnology developments in industrialized countries. Used mainly in the former soviet block from the early 30's to nowadays, bacteriophages are now regaining interest into western countries. Antibiotic and antiseptic failures against a wide range of bacterial strains certainly opens the door to such products.

Pherecydes Pharma Co. is involved in the development of life sciences products using phages. As a new actor in this world, we were puzzled by the lack of information related to our nascent industry and decided to create **The Phage Industry News Letter**, dedicated to bacteriophages and their practical use.

Each quarterly edition will deal with a domain using full or parts of living or dead phages. Topics will address diagnostic, therapy, disinfection, animal care, nanowires... Voluntarily focused on industrial applications, the minute will enable companies to have their say about technological data, markets to be conquered or strategic events.

EDITORIAL

A TOOL OF THE FUTURE

In this first edition, we give the floor to one of the main proponent of phage revival in western industrialized countries: Rosemonde Mandeville, President and CEO of Biophage Pharma Incorporated in 1993 (Montreal, Canada).

Thank you for being the genuine interviewee of The Phage Industry News Letter:

Q: *Phages have been characterized in the early 20th century, why is there today a renewal interest in Western countries?*

R: I believe that patients continue to suffer and die unnecessarily from superbug infections and foodborne diseases. The exponential rise of multi-resistant bacterial strains has rapidly caused one of the worst and most pressing public health problems. Development of alternative anti-infective modalities has become one of the highest priorities of modern medicine and biotechnology.

Q: *You created and are currently managing Biophage Pharma since 1993. I believe it was one of the first Western Companies working on bacteriophages. Why did you create the Company?*

R: I was, at that time, a university professor when I discovered, because of our researches, that development of new drugs was possible: thanks to phage display libraries! My main concern was to diagnose and fight bio threats using modern technologies: one of them was using phages for the early diagnosis of bioagents, as well as an alternative to vaccines and antibiotics.

Q: *What are other areas in which one you believe that phages have a future?*

R: We can look at phages as a way to combat bacterial infections whatever the strain is! That is why food safety, veterinary applications, environmental sanitation and human therapeutics are fields that we look at.

Q: *Today, we can say that Big Pharma are not investing in technologies based on phages. Why is that and do you believe this is going to change in the future?*

R: Big Pharma are still very keen on using antibiotics because this is a very big tool that they already have. They are looking at phages on the sideline to see what development are being done. But we have seen what happened with the generic drugs: Big Pharma have fought for a long time against them and now they are producing them.

Now that FDA approved the use of lytic phages as food additive, and EPA also allowed them to be used in the agriculture sector, this is the beginning of an increasing interest in the phages for therapy and diagnostic.

Thank you very much for your time and your participation Dr. Mandeville.

*For a full version of this interview, please visit our website : www.pherecydes-pharma.com
For more information about Biophage Pharma, please visit www.biophagepharma.net*

HOT TOPICS

■ **The NIH creates 'superphages' !**

Researchers at NIH (National Institutes of Health) developed an interesting approach to fight bacterial infections: a method of engineering phage that have multiple binding sites. This enables increasing the number of targeted bacteria by one bacteriophage. [link to the whole article](#) 🖱

■ **3-D cells culture, thanks to phages**

A revolutionary cellular model that mimics the functions of living tissues have been developed by researchers from The University of Texas. They make cells levitate by adding them with magnetic nanoparticles to a gel containing phages. The viruses cause the particles to be absorbed into cells. This technique can be used, for instance, in the building of organs in laboratories ! [link to the whole article](#) 🖱

■ **Two Vidas tests obtain the ISO certification**

Vidas tests detecting *Salmonola* species and *E. coli* O157:H7 strains are used by the industrials of meat. Made by BioMérieux in collaboration with Profos, such kits use phage proteins implicated in the recognition and the binding to the bacterial wall.

[link to the whole article](#) 🖱

THE CHALLENGES

- Phages and bacteria have been competing for more than 4 billion years, way before any animal organisms were born. They were already facing each other in the genuine primordial life creation soup.
- It is in water - oceans, rivers (streams, field run off) or waste water (treatment plants, sewage...) - where bacteria are particularly abundant, that the higher population and wider diversity of phages can be encountered. Phages can be counted at a number of 30 to 100 millions per milliliter.
- One likely challenge concerning phages is its public acceptance as beneficial living organism for humans and animals. **Are bacteriophages dangerous? The answer is NO.** They can be found anywhere. They are the most ubiquitous organism on Earth. They represent a green, natural way of controlling the bacterial flora of an ecosystem. Thus, every place bacteria can be found, there are millions of bacteriophages.
- The phage industry is an emerging but growing sector. More than 60 companies worldwide are now dealing with phage applications or products. Although limited today and typically composed of small size companies, the sector is getting up to speed. **The challenge will be to transform this promising area into a successful business.**



About Pherecydes-Pharma

Pherecydes-Pharma is a privately owned start up Co. involved in the development of phage based products, for both diagnostic and therapeutic applications.

The company mission is to develop new tools to rapidly detect and treat people and their environment against a large range of biothreat agents, including multi-resistant, emergent or previously uncharacterized bacteria.

www.pherecydes-pharma.com

TO GO FURTHER ...

A Tribute To Eastern European Countries

- In the early forties, phages were used in the fight of various infections. However, phage therapy were sometime inefficient because of poorly prepared preparations (no or poor phage titer, and/or insufficient virulence). Added to the advent of antibiotic (penicillin) discovery and commercialization, the production of therapeutic phages ceased in most of Western countries by the seventies.
- However, phages continued to be widely used as therapeutic products against pathogenic bacterial infections in Eastern Europe and the former Soviet Union : prestigious institutions like [Eliava Institute](#) of Tbilisi or [The Institute of Immunology and Experimental Therapy](#) of Poland were and still are actively involved in therapeutic phage research and production.
- Today, in average, 5% of pathogenic bacterial infections are acquired within hospital environment. Three bacterial species are the most prominent ones: *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli*. Many strains developed resistance to all antibiotic modes of action, making the development of alternative therapies essential. Thanks to the determination of Eastern European institutions for keeping up with phage developments during all these years: their scientists inspired the emergence of numerous phage companies in the West.

A Growing Field

- In recent years it has become widely recognized that bacteriophages bear attractive applications in several markets: one of them, the anti-bacterial sector weighted 38.3 Md\$* with a growth rate of 6 % in 2008.
- Besides, phage based products are already implemented in the food and beverage diagnostic sector: 2.05 Md\$* - yearly growth rate: 8.6 % in 2008.
- All around the world, bacteriophages are becoming tools that can't be ignored for future industrial advances. While their use was mostly confined to East European countries until the late nineties, they are going to be part of the third life science revolution: the switch from using biological molecules to entire living organisms.

*source : strategic consulting, inc

ON THE HORIZON ...

This number one of **The Phage Industry News Letter**, outlined the growing role played by bacteriophages in the life science industry. **Our next issue will tackle the use of bacteriophages in decontaminating** food (meat...) and other products or areas contaminated by bacteria.