



Going viral



Judy Diamond: Project Director



Science education is developing new and innovative means of communication that compete directly with global media to reach the 'YouTube Generation'. The truly interdisciplinary team of the SEPA-funded **World of Viruses** project is discovering how best to spread the word

"WE LIVE," the project's homepage announces, "in a world of viruses." Indeed, viruses are the world's most abundant biological organisms. While they can be deadly, they provide important tools for developing treatments and building nanotechnology. So the challenge for World of Viruses is to engage the public with the ubiquitous yet mysterious virus, taking them from confusion and misconception to curiosity and inquiry.

As Project Director Dr Judy Diamond explains, there was a strong rationale for focusing on this subject: "The project focuses on virology because it is relevant to people's health and wellbeing. Knowing something about viruses

can help make people's lives better. And this is particularly true for teenagers". The project started in 2007, through a Science Education Partnership Award (SEPA) from the National Center for Research Resources at the U.S. National Institutes of Health, with the aim of educating people about virology through public radio programmes, comics, interactive apps, and curriculum resources.

Through this range of resources, Diamond believes a lifelong engagement can be stimulated: "A bit of fun and fascination about how viruses work can stimulate further learning when a teenager sees a newspaper article, listens to the radio, or sees a brochure

in a clinic," she asserts. Bringing together the Nebraska Center for Virology, the University of Nebraska State Museum, and Soundprint Media, Inc. with artists, writers, and multimedia developers, the project has expanded into new dimensions.

INFORMAL LEARNING

Diamond started her career in ethology, studying the behaviour of coyotes and more recently, New Zealand parrots. After working with Frank Oppenheimer at the Exploratorium science museum in San Francisco, Diamond became enthralled with informal science education. Since then, she has directed national and award-winning projects on evolution,

science media, and women in science. Diamond feels strongly that people need to have an element of choice in how they learn. Informal learning involves the construction of knowledge and patterns of reasoning through everyday interaction with ideas and experience. Diamond considers the self-motivation required by informal learning to have major benefits: "In informal learning, it's the learner who determines which experiences they are going to undertake, how long they spend, and with whom they interact socially," she outlines. "In the formal classroom educational setting, aims and outcomes are pre-decided, but informal learning, like World of Viruses, you do because you want to."

While schools have an important role, taking the initiative in learning can be very influential in shaping one's reasoning patterns and worldview. This can be gradual, but laying the groundwork for young people's future interest must start somewhere, Diamond explains: "Knowledge scaffolds on experience. Informal learning is all about scaffolding little bits of experience on others". The project tries to strike a relevant tone for adolescents to help direct their energies into positive learning: "Kids are going to learn from their peers and make choices as to what they focus on," continues Diamond, "and our job is to inspire them to become interested in science".

READING, WRITING AND RADIO

The project partners with *New York Times* science writer, Carl Zimmer, who previously worked with Diamond on the National Science Foundation-funded 'Explore Evolution' exhibit. Zimmer has produced a book of short, accessible essays called *The Planet of Viruses*, published by University of Chicago Press and set to appear as a book and e-book in Spring 2011. For an established science communicator like Zimmer,

Focus on: Benjamin Jee, Cognitive Scientist

Having previously worked on projects to do with spatial learning and science education, Jee became involved in the project through his postdoctoral advisor. With his background in cognitive psychology, and especially conceptual learning, World of Viruses appealed to Jee: "I was immediately interested in people's conceptions of viruses, how they affect us, how our bodies respond to them and so on". In Jee's estimation, the potential for cognitive science to tailor learning is great: "If we understand how people form concepts, encode memory and reason, we can adapt education to the needs of individual students".



the project offers a great opportunity to bring fresh insight to the public: "Viruses are like every other part of nature: rich, fascinating, and counterintuitive. They also happen to be very important both to human health and to the function of the planet's ecosystems. I just wanted to share these insights with my readers".

Another element of World of Viruses is the project's documentaries for public and satellite radio. They are produced by Soundprint Media, a leading public radio broadcaster in the U.S. whose work reaches over 5 million listeners. These programmes explore ocean viruses, influenza, human papillomavirus, HIV and other viruses. Moira Rankin, Head of Soundprint, explains how they selected these stories: "By picking commonly known viruses, we can use them as a jumping off point for a discussion about new research or innovations in science. We also like to throw in some surprises". The scope of these programmes shows just how significant viruses can be to our health, through personal stories, but also to the economy and the planet's ecosystem. As with the rest of the resources produced by this project, offering a single point of view was not an option.

Early in the work, Diamond and her team realised that technology and the visual media are a huge driving force for young people. To fully engage them in the project, they would have to harness both traditional media in radio and print, but also take on the full armoury of web and graphics – including comic books and iPod and iPad applications.

COMICS ARE CATCHING

It was the project's initial engagement with libraries which gave rise to the idea of comics. Diamond's team realised libraries could be a gateway for audiences not interested in science to become engaged with virology and infectious disease through the use of 'viral comics': "There's a huge increase in the use of libraries by teenagers, particularly those from diverse or less privileged backgrounds," she explains, "because libraries offer access to technology they may not have at home".

From the beginning, Diamond took the form very seriously, enlisting the best collaborators: "My approach to finding comic book artists and writers is the same as with science journalists and virologists: I look for people who already have a great deal of experience working in a particular modality". Tom Floyd has been creating comics for 30 years and Martin Powell has written scripts for hundreds of comics. The point is not to crudely attach science to comics, but to inhabit the form and make the stories – on the same viruses as the radio programmes – stand for themselves. Diamond is passionate about the potential of comics for telling these stories: "They have their own language and style. We're trying to take advantage of what makes a comic interesting: stories within stories – changes of perspective in time and space. You can go from outer space to a virus in two frames".

Focus on: Carl Zimmer, Science Writer



A *New York Times* science writer, Carl's previous subjects have included *E. coli*, evolution and the human brain. He believes his book of essays, *The Planet of Viruses*, published in Spring 2011, should have broad appeal: "I think it will be interesting both to young people and adults, scientists and non-scientists alike". He will make viruses less alien through

focusing on the process of their discovery, bringing a human element to something that can seem far from our existence. Zimmer believes clear language is key: "I avoid all jargon; I can typically find a plain English alternative that still captures the essence of the scientific insight," he explains. "It's a fast-moving field, so there is lots to talk about. I hope that people develop a fascination with viruses, rather than just a fear."

The learning experiment

Funded through the Omaha Schools Foundation, **Omaha Science Media Project** sets out to engage diverse high school students in school science, media production, and future careers in biology and health sciences

IN THE SUMMER of 2009, 16 teachers and 15 students from Omaha Public Schools joined a two-week workshop 'Exploring Viruses' at the University of Nebraska Medical Center and the Nebraska Center for Virology as part of a pioneering education project. Teachers and students worked together with journalists and medical researchers to produce video and audio essays, learning the science of viruses while developing journalism skills. In this experimental setting, the Omaha Science Media Project (OSMP) aimed to learn as much as possible about integrating science media activities into the curriculum before disseminating their project to schools in the region and across the country. Through telling stories of scientists working with viruses, the project aimed to increase engagement with science in school and to broaden the science teaching skills of the educators involved.

UNDERSTANDING SCIENTIFIC PROCESSES

A collaboration between Omaha Public Schools (OPS), Nebraska's leading biomedical research institutions, professional media organisations,

science educators and learning researchers, this project is an innovative approach to learning. It engages both students and teachers, learning through experience and by direct engagement with current scientific research. The aim is not only to change the way students learn, but to offer educators fresh approaches to teach science by encouraging teachers and students to create media deliverables on biomedical research. The project draws upon an extensive network of collaborators to offer research experiences beyond simple demonstrations and to invite real understanding of scientific research processes.

Through covering local science stories in depth and developing science media skills, OSMP expects students to show enhanced performance in standardised tests and standards-based science courses. The model pilot programme is intended to create proof of concept on such integration of media with science for enhancing engagement with students in biology and health sciences, as well as an infrastructure among public schools to leverage media in this way in future. A model for understanding scientific

research, this project acts as an example for schools in this region, as well as demonstrating professional development in science to teachers across America and beyond.

So far, the project has certainly affected students' awareness – as one says in the website's introductory film: "About viruses, I've learned they're considered obligate intracellular parasites – most people wouldn't know what that means!"



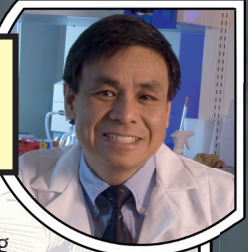
Through personifying viruses as protagonists in several comics, Diamond hopes to show that they are not just particles that make us sick. Readers will come to understand the infection process from the virus's perspective. These comics are another way to build the 'scaffolding' of knowledge that might mean a young person seeing these will, later in their lives, continue engaging with virology topics.

A COMMUNITY OF EDUCATORS

Mediating complex subjects like virology, without skewing the science, can be challenging – but this is at the forefront of Diamond's approach: "The scientific integrity of everything we do is absolute. Virologists check everything, again and again – we drive them crazy! But that is just the launching point – our end point is motivating our audience to be interested in the subject". The team has its own virologist, Dr Anisa Angeletti, and seeks continuous interaction with specialists on specific viruses. From Carl Zimmer's world-class writing on microbiology to Soundprint's extensive track record and the comic artists' decades of experience, this is a high-calibre collaboration.

Across the range of disciplines, innovation is always at the core of their work, Diamond

Focus on: Dr Charles Wood, Nebraska Center for Virology



Based at the Lincoln Campus of the University of Nebraska, the Center for Virology has strong research, training and outreach aspects, bringing together specialists from the campus in one place. This project is a great way to interest people at an early stage and create a dialogue, Wood believes: "We want them to learn the basics and to challenge them to change some of their concepts. Some people don't believe in evolution and we use viruses as an example for this; if we can challenge some dogma, then that's a good thing". The Nebraska Center for Virology provides scientific support for the World of Viruses project. The project includes a focus on the Center's research on HIV/AIDS – a globally significant issue: "The project's radio programmes and teaching materials will be used, not only in the U.S. but in developing countries as well". Subjects of broad public interest like this could be more effectively communicated through these modes, Wood agrees: "Informal learning is quite unique – kids don't feel like they're being taught. They learn without realising".

INTELLIGENCE

WORLD OF VIRUSES

OBJECTIVES

This initiative introduces people to virology through radio programmes, graphic stories, iPad apps, Web activities, and a book that explores some of the biggest questions about viruses.

KEY COLLABORATORS

Judy Diamond, Professor, University of Nebraska State Museum

Charles Wood, Director, Nebraska Center for Virology

Moira Rankin, President, Soundprint Media Center, Inc

Carl Zimmer, Science writer and author of *VoV* book of essays, *A Planet of Viruses*

David Uttal, Cognitive science professor, Northwestern University

Benjamin Jee, Cognitive scientist, College of Holy Cross

Tom Floyd, Comic illustrator, Nebraska Educational Telecommunications

Ian Cottingham, Computer scientist, Red Brain, Inc.

Anisa Angeletti, Virologist, Nebraska Center for Virology

Peter Angeletti, Virology professor, Nebraska Center for Virology

Amy Spiegel, Evaluator, University of Nebraska Center for Educational Innovation

Ann Downer-Hazell, Science writer

Adam Wagler, Multimedia designer, University of Nebraska School of Journalism and Mass Communications

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UNIVERSITY OF
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Focus on: Moira Rankin,
Soundprint Media
President



Soundprint Media Center, Inc (SMCI) is a national non-profit production, training and educational centre that produces the longest running documentary series on U.S. public radio. Executive Producer, Moira Rankin, explains the challenge of bringing viruses alive in the medium: "It is always interesting to talk about the invisible on the radio. We try and make connections with strong storylines, that spark the imagination – and let scientists tell the story, revealing passion, humour and curiosity".

Working closely with Dr Wood and Dr Diamond and the project's scientific advisors, Rankin's team look to Carl Zimmer's writing for ways to articulate complex science and expand listeners' ideas: "Most people don't realise oceans are filled with viruses. Discussing them helps listeners understand viruses are not evil (ocean viruses are pretty harmless) or good, they just are agents with intriguing functions". Only after extensive reading and dialogue does the final draft materialise, Rankin explains: "A clear story emerges once we dig deeper into the research and the way the virus operates in everyday life".

observes: "We see ourselves very much as an experimental project – we don't have all the answers, but we do have the resources to try things out, bringing cognitive scientists with us. We talk a lot to librarians and kids, see what's working and what's not, and change what we do: we're a community of educators trying to learn how to do things better". This community is reaching out to young people across the country and beyond – through the Center for Virology's strong links with Zambia – to create a sophisticated dialogue about virology.

SOPHISTICATED WORLDWIDE TEENAGERS

With physical books waning, World of Viruses is looking to the future of informal learning, through readable comics, but also interactive apps. Diamond has no doubt that interactivity could be an important tool, but it also raises questions: "We still don't know what enhances or what detracts from the experience – what works? What is the 'spark of interest' that contributes to the way people think, and how much difference does it make? There are cognitive issues at the basis of informal learning". To explore these questions, the project works with two cognitive scientists,

Benjamin Jee and David Uttal. They are investigating how people's mental models of viruses change through experience with the project materials.

Center for Virology Director, Dr Charles Wood, believes the combination of elements included in the World of Viruses project is a potent one: "It's a good partnership to reach the public through broadcasting, museums and education. We'll focus more on the hardcore research – I think these two arms work very well together". This exposure to real researchers and research environments could indeed be the spark young people need to pursue an interest or career in virology.

Diamond believes the challenge for this and other science outreach projects will be the high standard young people now expect: "Teenagers – whether in Africa, the UK or the U. S. – are incredibly sophisticated today: their expectations are based on global media resources. When we move into education, that's what we're competing with – television, YouTube – and if our stuff doesn't make the cut, nobody will pay attention to it".

