
Tracking Life

The Timescale of Evolution



**An educational, science-based television series,
with digital media online component**

**A proposal from Production Maverix
in association with Kublacom Pictures**

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Introduction

One of the toughest parts of understanding the evolution of life on Earth is having a comprehension of the timescale - 4 billion years. This is a length of time that is almost impossible for our brains to comprehend and process.

This multi-part series takes the unique approach of mapping 4 billion years of the evolution of life on to a 400-meter running track (1 meter is 10 million years), which not only makes comprehension of the timescale of evolution possible, but also makes it tangible and memorable.

At almost every high school in the country, there is a 400-meter running track. In schools across Canada, students are typically taught science subjects separately, in isolation from one another. This leads to a lack of a 'big picture' perspective that is necessary to be able to use scientific knowledge at higher levels of study (university) and as informed citizens in society. By using a typical high school running track, a variety of sciences can be integrated and presented in an informative and accessible way.

Objectives

The objectives of the series are four-fold:

1. to inform and educate the general public on the evolution of biodiversity on Earth, the interplay between the different scientific fields in studying and understanding the causes and consequences of events throughout Earth's history;
2. to highlight the brief temporal relationship and the impact of humans on the story of life on Earth;
3. to provide an innovative way for students to see the sciences in a unified way and better prepare them for higher learning;
4. to provide a framework for High School teachers to develop curriculum for more effective and integrated teaching of the sciences to students.

Creative Approach

In order to tell the history of life on Earth by linking the various sciences in an informative yet accessible approach, we will use a 400-meter running track as a the main conceptual approach. Individual episodes will explore a time period or event in the evolution of life and will link the presentation to the present day and on the impact of human evolution and activity.

To provide an introduction to the concept of the series, we have produced a short demo that demonstrates the creative approach we have in mind. It does not however reflect the overall high production values that will be used in the final product. The demo can be viewed at the following link: <https://vimeo.com/154199853>

The use of the 400-meter track has two notable advantages in understanding the space and time dimensions of the history of life.

1. It improves upon classic models for the timescale of evolution that have included a 24-hour clock and 365-day calendar. These models are useful, but their main drawback is in the abstract nature of the representation of time. It is challenging, even for trained scientists, to have a meaningful discussion of a 4 billion year time period on an abstract level, and of important evolutionary events during that time period, using these models.
2. The physical nature of the 400-meter track provides an accessible and familiar representation of 4 billion years that can be seen and felt by viewers, improving their ability to comprehend, and more importantly to retain a sense of perspective on the events having occurred in the history of life on Earth.

The presence of running tracks in schools around the country will allow teachers to take learning outside of the classroom and to promote a more informal, participatory and active learning experience, which has been shown to improve upon student learning compared to passive learning approaches, such as taking notes.

The series will consist of a male and female host, a small supporting cast and knowledgeable guests. It will incorporate infographics, animations and video clips to present a high-quality visual experience. The use of the 400-meter track will provide many opportunities to present science and the objectives of the series in a fun and entertaining manner. Additionally, the series will be coupled with website content, where viewers can click on links and follow modules, videos and other web content to enhance the overall learning experience.

The Episodes

Working with a panel of expert scientific advisors, we are developing topics that will focus on certain aspects of the evolution of life on Earth. Each episode will include reference to the human dimension through the lens of various branches of science.

Sample Episode 1 (Chemistry and the Environment)

Through biological processes such as photosynthesis that lead to the production of oxygen or geological and industrial processes that produce CO₂, we will explore the changes in oceanic and atmospheric chemistry over time and their implications on the greenhouse effect and the evolution of biodiversity.

Sample Episode 2 (Geology and Geography)

Through an exploration of the geology of continental drift through tectonic plate movement, we will illustrate the effects of geography and cataclysmic events on the processes of species extinction, evolution and the distribution of organisms and ecosystems around the world, known as biogeography.

Sample Episode 3 (Changes in Biodiversity Levels)

In this episode we will explore the causes and consequences of the events associated with mass extinctions on earth. We will identify the reasons behind the major shifts in fauna and flora and describe the changes that they provoked in the kinds of life-forms that survived these transitions. A special emphasis will be placed on the recently named Anthropocene, in which human activity is the leading cause for the current mass extinction occurring nowadays.

Potential Ideas for Other Episodes

- ❖ a detailed look at the recent timeline of the hominin lineage (human ancestry) that leads to modern humans,
- ❖ changes in plant species diversity and the way that species groups interact with one another over space and time, known as community structure,
- ❖ chemical and physical processes related to UV and ozone, impacts from asteroids, volcanic activity etc.,
- ❖ links between the evolution of aquatic and terrestrial flora/fauna,
- ❖ changes in biomass of major kinds of microbes, plant, fungi and animals,
- ❖ a look into the future, hypothetical scenario, maybe once humans have left Earth for space exploration of the universe and/or have gone extinct, as well as the potential consequences on other organisms and their ecosystems,
- ❖ genetic and physiological changes in microbial and invertebrate communities over time (incl. resistance to pesticides, antibiotics etc.).

Next Steps

We are currently in discussion with science teachers, superintendents and principals of the Ottawa-Carleton High School Board to show the existing demo episode to students who have completed their senior science course curriculum. Using focus groups and surveys, we will measure the appreciation and learning potential of the demo video to improve understanding of the evolution of life on Earth. Focus groups will also be conducted with a general adult viewing audience.

This feedback will help us fine-tune the overall concept for the "Tracking Life" series and creative approach and to empirically measure the learning outcomes and goals related to the high school science curriculum.

Creative Team and Science Advisory Panel

We have gathered a group of expert science educators and communicators who are actively involved in the creative development of content and narration for the episodes, as well as to act as quality control editors to ensure the series' scientific accuracy.

Dr. Adam Oliver Brown - Host, Producer and Educational Advisor

Dr. Adam Oliver Brown is an award-winning science educator with a background in the performing arts. Dr. Brown has a great deal of experience writing, developing, producing, hosting and narrating science education video productions and has worked with *The Nature of Things* for CBC television, *Love Nature*, as well as *Finding Stuff Out* and *The Prime Radicals* for TVO Kids. Television episodes on which Adam was involved as an advisor, writer and host have been nominated for a number of media industry awards, including a Screenwriter's Award from the Writer's Guild of Canada, a Rockie Award from the Banff World Media Festival and a Golden Sheaf Award from the Yorkton Film Festival. Recently, Adam's TEDx talk was featured on a high profile Netflix television series entitled Chelsea Does. Adam Oliver Brown is a sought-after and respected science communicator and was recently elected as an Associate Member of McGill's Office for Science and Society. Dr. Brown is currently a Professor in the Department of Biology at the University of Ottawa with an expertise in science education and science communication in both French and English. www.adamoliverbrown.com

Dr. Ian Clark - Producer and Educational Advisor

Dr. Ian Clark has a Ph.D. in Chemistry from UBC (1990). Ian then spent several years as a Research Associate at the National Research Council of Canada in the area of protein structure and function, before moving into the world of intellectual property as a patent agent, where he has worked for almost 20 years with a focus on the protection of chemical, pharmaceutical, and biotechnological inventions. Ian came up with the concept of mapping 4 billion years onto a 400m running track while watching the 2008 Beijing Olympics on TV. He quickly recognized that since a running track can be found in almost every school, it could become a very powerful teaching tool to help children appreciate many time-related concepts, including how long life has been on Planet Earth, and the relatively recent origins of their human ancestors.

Andrei Zubok - Director/Producer

Andrei Zubok is an independent filmmaker based in Ottawa, Ontario, who produced and directed the demo episode for the "Tracking Life" series. Andrei has attended a number of film and television production workshops in Canada, the US and abroad and has completed studies in the Documentary Directing Program at the Graduate School for Directors and Screenwriters in Moscow. His video production company, Production Maverix, has produced videos in Ottawa for clients including Sparks Street Mall Authority, Bayshore Shopping Centre, Ottawa Jazz Festival and the Ottawa Centre Ecodistrict. As well as filming in Canada, Andrei has also shot documentary footage in Russia, Ukraine, Indonesia, Uganda and Cuba. www.productionmaverix.com

Ed Kucerak - Director/Producer

Ed Kucerak has been producing and directing documentaries and television programs for over two decades. Founder of Kublacom Pictures, an Ottawa, Canada-based independent film and television production company, his productions have been broadcast on television and featured in film festivals in Canada, the United States and around the world. Ed has directed the documentaries *Partners for Peace*, *How Can a Boy, This is My Witness* and *One of the Last*. He is also producer of the documentaries *Lady in the Garden* and *The Secret Lives of Butterflies* as well as the television series *Get a Life (Seasons 1 to 4)*, *Grouille-toi (Seasons 1 to 4)* and *Homes By Design (Season 4)*. Ed is an active member of the Documentary Organization of Canada and Ottawa's SAW Media Arts Centre. www.kublacom.ca

Jane Gurr - Producer/Writer/Researcher

Jane Gurr is an Ottawa-based documentary film producer and has been an associate of Kublacom Pictures for the past fifteen years. Jane has a Master's degree in Sociology and joined the film industry following a career in international development, in program/project management and evaluation, and adult education. She was drawn to filmmaking by the power of visual storytelling to inform viewers about injustice and human rights issues around the world, and to motivate action for positive social change. With Kublacom Pictures she has written and produced documentaries and client-driven educational productions, including, *Partners for Peace*, *How Can a Boy, This is My Witness*, and, *Parenting: An Inuit Father's Perspective*. Jane is an experienced writer of educational and training materials for adults and is trained in participatory approaches to adult education. She is a founding member of the Ottawa-Gatineau chapter of the Documentary Organization of Canada. www.kublacom.ca

Edward Kay - Writer

Edward Kay is an award-winning writer for both adult and children's television. He has worked on *This Hour Has 22 Minutes* for CBC television and *Finding Stuff Out* for TVO Kids among many other successful projects. Edward has won numerous awards and nominations, including three Gemini Awards, three Canadian Comedy Awards, a Canadian Screenwriting Award and an International Emmy nomination.

Richard Reed Parry – Original Music Composer

Richard Parry is a core member of the Polaris Prize-and Grammy Award-winning band *Arcade Fire*. He also creates and performs music as a multi-instrumentalist, composer and producer with a number of other acts, including *Bell Orchestre*, *Little Screem*, *Sufjan Stevens and The National*. Recently, he has composed and produced a series of classical pieces that were performed and recorded by members of *The National*, *yMusic* and *Kronos Quartet*.

Dr. Jeremy McNeil - Scientific Advisor

Dr. Jeremy McNeil is an internationally celebrated scientist, a fellow of the Royal Society of Canada and a recipient of the Royal Society's highest honour for science communication, the McNeil Medal (no relation) for the Public Awareness of Science (1998). Dr. McNeil currently holds the Helen Battle Professorship for Chemical Ecology in the Department of Biology and was a past scientific director of the Biotron at Western University.

Dr. Brock Fenton - Scientific Advisor

Dr. Brock Fenton has been active in the public communication of science by speaking frequently to public schools and writing for popular magazines and online media and he was awarded the Royal Society of Canada's McNeil Medal for his work on the Public Awareness of Science (2002). Dr. Fenton is currently a Professor and Chair in the Department of Biology at Western University.

Ms. Susanne Gerards - Educational Advisor

Ms. Susanne Gerards is the Head of Science at the Nepean High School in Ottawa, Ontario. She has taught High School Biology since 2000 with a focus on critical thinking and inquiry. Her teaching of biology emphasizes a coherent understanding of the sciences under the umbrella of evolutionary principles.

Dr. Giuliano Reis - Educational Advisor

Dr. Giuliano Reis is an Associate Professor of Science Education in the Faculty of Education at the University of Ottawa. In addition to his vast experience as a school science teacher he has a great deal of experience as an editorial board member of various national and international scholarly journals on STEM education.

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