

HUMANS & THE MICROBIOME

Examines the role of the human microbiome — the microbes that live in and on us — in human development and behaviour, and how it is affecting our evolution and society.

Humans can be thought of as holobionts or “meta-organisms” — a group of organisms that work together as one larger organism for the benefit of all. Program fellows continued to make strides this year towards understanding this dynamic interaction between guest and host, and how the microbes in and on us contribute to our overall development, health and behaviour. The program is also focusing on how this relationship has altered during human evolution and amidst significant anthropological events throughout human history.

The two program meetings held this year highlighted recent collaborative efforts between anthropologists and microbiologists. Fellows presented their progress on a revolutionary proof-of-concept technique for sampling ancient human remains and dental samples to determine the composition of the microbiome in earlier times and how migration and colonialism affected the human microbiome in different regions of the world. Shifts in microbial diversity following the establishment of the Pasteurian era were also discussed, including how this change may relate to modern-day chronic disorders such as inflammation and autoimmune disease. And new work is examining the effect of the maternal microbiome on child development as well as the transmission of microbes, both generationally and through intra- and inter-species interactions.

Because of the role of microbiome research in informing lifestyle choices, cultural habits, nutritional choices and general human health, program fellows participated in a wide range of knowledge outreach and mobilization activities for the public and targeted knowledge users. An emphasis moving forward will be to promote the incorporation of microbiota knowledge and research into the medical and health sciences curriculum for undergraduate students.

RESEARCH HIGHLIGHTS

A collaboration between Fellows **Tamara Giles-Vernick** (Institut Pasteur), **Hendrik Poinar** (McMaster University), **Frédéric Keck** (Musée du quai de Branly), **Philippe Sansonetti** (Institut Pasteur) and **Brett Finlay** (University of British Columbia) resulted in a breakthrough technique for sampling dental pulp, using three skull samples generously provided by the Université Cheikh Anta Diop in Senegal. A patent has been filed for the new technique, and plans to analyze more samples are currently underway. The aim is to look more deeply at the effect of European colonization on the microbiome of humans in Africa.

A new collaboration between Program Co-Director **Brett Finlay** (University of British Columbia) and CIFAR Child & Brain Development Senior Fellow **Michael Kobor** (University of British Columbia), will look into the effects of poor nutrition on the prevalence of environmental enteropathy, a disease of the intestines that causes inflammation and prevents proper nutrient uptake. The combined expertise of the two programs will be harnessed to understand the effect of the gut and associated digestive processes on DNA methylation (i.e., changes to DNA structure) in early life linked to the development of the disease.

Other Notable Publications and Outputs

- Program Co-Director **Brett Finlay's** (University of British Columbia) recent book, *Let Them Eat Dirt*, outlines the importance of not oversanitizing children to promote healthy immune system development and microbiota formation early in life.
- Thaiss CA, Elinav E et al. 2016. Persistent microbiome alterations modulate the rate of post-dieting weight regain. *Nature*. 540: 544-551.

AT A GLANCE

FOUNDED: 2015

PROGRAM DIRECTORS: B. Brett Finlay, University of British Columbia, and Janet Rossant, The Hospital for Sick Children

FELLOWS, ADVISORS AND CIFAR AZRIELI GLOBAL SCHOLARS: 21

INSTITUTIONS REPRESENTED: 16, in 8 countries

FIELDS AND SUBFIELDS REPRESENTED: microbiology; developmental and evolutionary biology; bacteriology; immunology; history; cultural and medical anthropology

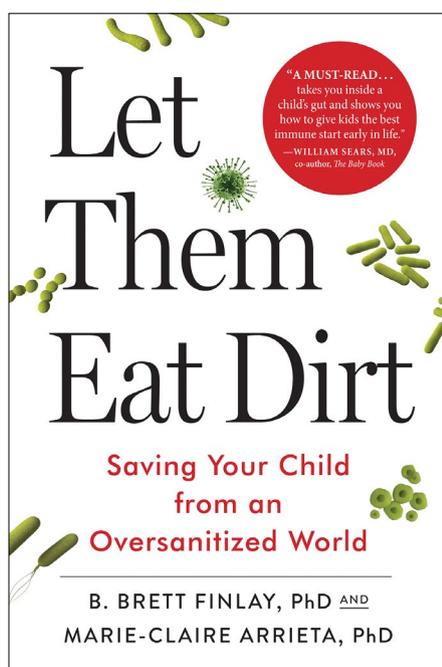
MEETINGS: 2; in Portland, USA, and Montebello, Canada

RELEVANT KNOWLEDGE USERS: medical community (practitioners, medical schools); public health agencies; nutritional community; government policy makers; global health agencies

PARTNERS: Brain Canada Foundation through the Canada Brain Research Fund | Fonds de recherche du Québec — Santé | Genome BC | Genome Canada

SUPPORTERS: Jon and Nancy Love Foundation at Toronto Foundation | Manulife | Trottier Family Foundation | (1 Anonymous Donor)

TO LEARN MORE: www.cifar.ca/research/humans-the-microbiome/



IDEAS EXCHANGE

The program began a series of conversations with the public health sector around the role of the microbiome in human health, development and society. In April 2017, fellows from the program met with federal policy makers and public health officials in Ottawa to explore how the program's research intersects with key issues and challenges faced by participants. The program also hosted a roundtable in London, U.K., in May that brought together fellows from the program, microbiome researchers, foundations and public health officials. Participants discussed how to better connect research in nutrition, prenatal care, public health and industry to ensure that the role of the microbiome is better understood and communicated.

PUBLIC AND DONOR EVENTS

Co-Director **Brett Finlay** (University of British Columbia) presented the CIFAR-Royal Institution Public Lecture at the Royal Institution for Science in London, U.K. His talk focused on his new book *Let Them Eat Dirt: Saving Your Child from an Oversanitized World* and the important role that microbes play in human health, development and society. More than 100 members of the public attended the talk and a book signing that followed.

GLOBAL ACADEMY

The program welcomed its first two CIFAR Azrieli Global Scholars in 2016: **Katherine Amato** (Northwestern University) and **Corinne Maurice** (McGill University). Both presented their work at the November 2016 program meeting.