Organized in collaboration with

Understanding and Responding to Global Health Security Risks from Microbial Threats in the Arctic

6 – 7 November 2019

Herrenhausen Palace
Herrenhäuser Straße 5, 30419 Hanover, Germany

Workshop Goals

- Bring together an interdisciplinary, international group of researchers and public health officials to explore what is known and what critical knowledge gaps remain regarding existing and possible future risks of harmful infectious agents emerging from thawing permafrost and ice in polar climates.
- Provide a helpful state-of-the-science overview and information to help frame new actions that advance research, surveillance, and response capacity.

Wednesday, 6 November 2019

8:30 AM **Welcome and Plans for the Workshop**
- Henrike Hartmann, Executive Management, Volkswagen Foundation
- Diana Wall and Volker ter Meulen, Planning Committee Chair and Vice Chair

8:45 AM **Vladimir Romanovksy, University of Alaska Fairbanks**
The driving forces: Arctic and Antarctic warming and permafrost thaw (observed and projected changes)

9:05 AM **Albert Osterhaus, University of Veterinary Medicine Hannover**
Emerging infectious and zoonotic diseases and environmental change; One Health

9:25 AM **Keith Chaulk, Stantec**
Broader global context, sustainable development goals, human dimensions

9:45 AM **Discussion**

SESSION 1: WHAT DO WE KNOW?

Guiding questions for the session:

- *How quickly is the permafrost thawing and where (including mountain glaciers and high altitudes)?*
- *What do we expect to find (animals? corpses? ancient pathogens in frozen animals? pathogens in permafrost?) and where? How old are the animals, corpses, ancient pathogens that will be uncovered in the next 5-10 years?*

- *What are the existing research efforts in permafrost now to determine if the DNA parts can be sequenced?*
- *What do we know about the microbial ecology of permafrost and ice environments and their sensitivity to climatic changes (including how fast frozen microbes can evolve)?*
- *What do we know about the viability of microorganisms in these environments?*
- *What do we know about our ability to detect changes/emergence in arctic peoples and animals?*

10:00 AM Jean Michel Claverie, Aix-Marseille University
Viruses in permafrost

10:30 AM *Break*

10:50 AM Alexander Volkovitsky, Russian Academy of Sciences and Yamal Expedition
2016 Anthrax Outbreak

11:10 AM Panel: Ecosystem Changes: What are the microbial threats we know are in the environment?
~5 minutes for each panelist, followed by discussion
Moderated by: Birgitta Evengård, Umeå University, Planning Committee Member

- Tom Douglas, CRREL: ecosystem-permafrost relationships, seasonal thaw, and thermokarst
- Emily Jenkins, University of Saskatchewan: diseases at the human / animal / environment interface
- Aleksandr Sokolov, Russian Academy of Sciences: terrestrial ecosystems of Yamal

11:50 AM Jan Semenza, European Centre for Disease Prevention and Control
Environmental and climatic determinants of infectious disease

12:10 PM Panel: Exploring the Potential Risk of Human and Animal Exposure to Threats
~5 minutes for each panelist, followed by discussion
Moderated by: Charles Haas, Drexel University, Planning Committee Member

- Natalia Pshenichnaya, National Medical Research Center of Phthisiopulmonology and Infectious Diseases: infectious pathology
- Anne Jensen, Ukpeavik Inupiaq Corporation (UIC) Science LLC: human adaptation in arctic and subarctic environments; traditional knowledge of Inupiaq peoples
- Dmitry Orlov, University of Moscow: infectious diseases
- Jay Butler, US Centers for Disease Control and Prevention: clear and present dangers from infectious diseases in Alaska related to climate change
- William Bower, US Centers for Disease Control and Prevention

1:10 PM *Lunch*

SESSION 2: WHAT DO WE NEED TO KNOW?

Guiding questions for the session:

- *Given the kinds of permafrost research on living organisms and disease organisms that will go on, which of these areas of research will expose scientists or the local communities to microbial risk? Will other activities such as oil extraction expose populations?*

- *What are best scientific judgments regarding what kinds of pathogens might be uncovered in the permafrost?*
- *Which of these might be still viable?*
- *What scientific approaches should be used?*
- *What kind of facilities/institutions should do the work?*
- *What are the different pathways through which people could be exposed to harmful infectious agents?*
- *What are the critical gaps in our scientific understanding and surveillance/observational capabilities?*

2:20 PM **Craig Stephen, Canadian Wildlife Health Cooperative**
Wildlife health surveillance

2:40 PM **Luise Müller, Statens Serum Institut**
Human health surveillance

3:00 PM **Panel: Priority Research Needs: What are the critical gaps in our scientific understanding and surveillance capabilities?**
~5 minutes for each panelist, followed by discussion
Moderated by: Robyn Barbato, Cold Regions Research and Engineering Lab, Planning Committee Member

- **Lise Øvreås, University of Bergen:** Arctic ecology and micro-organisms
- **Sanne Eline Wennerberg, Veterinary & Food Authority of Greenland:** human/animal exposure
- **Jessica Ernakovich, University of New Hampshire:** permafrost microbiome and Arctic biogeochemistry
- **Tatiana Vishnivetskaya, University of Tennessee:** microbial community structure and biodiversity of extreme environments
- **David Stanton, Swedish Museum of Natural History**

3:45 PM **Instructions for the Breakout Groups**

3:55 PM *Break*

4:15 PM **Breakout Group Discussions on Biosafety and Biosecurity Risks**

- *Group 1: Assessing lab procedures / techniques likely to be used*
- *Group 2: Appropriate biocontainment and engineering controls*
- *Group 3: Approach to risk assessment for this work*
- *Group 4: Impacts of organisms in thawing permafrost and exposed carcasses on indigenous and local communities*

5:15 PM **Breakout Groups Report Back in Plenary**

5:45 PM **Wrap-Up and Goals for Day 2**
Diana Wall and Volker ter Meulen, Planning Committee Chair and Vice Chair

6:00 PM *Adjourn Day 1 -- Dinner at Herrenhausen Palace*

Thursday, 7 November 2019

8:30 AM **Reflections on Day 1 and Plans for Day 2**
Diana Wall and Volker ter Meulen, Planning Committee Chair and Vice Chair

SESSION 3: RESEARCH AND OPERATIONAL PATHS FORWARD

Guiding questions for the session:

- *What are some key opportunities to facilitate multidisciplinary, interagency, and international cooperation and collaboration?*
- *How can we build upon existing research and observational programs and platforms?*
- *What sorts of ethical dimensions must be considered for working with indigenous communities, and for monitoring and recovering samples from human remains?*
- *What can we learn from research in other regions (e.g., Antarctic research)?*

8:45 AM **Michael Brubaker, Local Environmental Observer (LEO) Network**

9:05 AM **Eduard Zdor, University of Alaska Fairbanks & Cheryl Rosa, US Arctic Research Commission**
Zoonotic diseases of importance to subsistence communities

9:25 AM **Susan Kutz, University of Calgary**
Using indigenous knowledge and community-based surveillance to detect emerging pathogens

9:45 AM **Panel: Examples of International and Multidisciplinary Research Projects (From microbial discovery to surveillance to response)**
~5 minutes for each panelist, followed by discussion
Moderated by: Susan Kutz, University of Calgary, Planning Committee Member

- **Michael Bruce, US Centers for Disease Control and Prevention:** International Circumpolar Surveillance and collaborative One Health research in the Arctic
- **Trista Vick-Majors, Michigan Tech:** examples from Antarctic microbiology
- **Arja Rautio, University of Oulu**
- **Warwick Vincent, Université Laval**

10:45 AM **Instructions for the Breakout Groups**

10:55 AM *Break*

11:15 AM **Breakout Group Discussions on Harmonization of Surveillance Data**

- *Group 1: Need for special surveillance approaches*
- *Group 2: Current surveillance approaches in the Arctic*
- *Group 3: Need for international standards around surveillance*
- *Group 4: Microbiologic / diagnostic approaches for surveillance in the Arctic to have the earliest possible warning of diseases that emerge from the permafrost*

12:15 AM **Breakout Groups Report Back in Plenary**

1:00 PM *Lunch*

2:20 PM **Comments from Participating Stakeholders**

Which aspects of microbial threats in the Arctic may influence decisions at your agency or organization? What are near-term concerns vs. far-term concerns?

- Joshua Glasser, US Department of State
- Christina Chappell, US Agency for International Development
- Bert Rima, Wellcome-Wolfson Institute for Experimental Medicine

3:10 PM **Guided Discussion Session**

Facilitated by: **Bob Reiss, author and journalist**

3:50 PM **Final Thoughts and Wrap-Up**

Planning Committee Members

4:00 PM *Adjourn Workshop -- Planning Committee meets briefly to recap*