Contribution ID: **438** Type: **Poster presentation**

Unlocking natural Antarctic and Arctic archives of thousand-year-old RNA viruses

Tuesday, October 6, 2026 4:01 PM (1 minute)

Historical samples provide unique insights into pathogen evolution and help to uncover mechanisms underlying pathogen emergence, adaptation, and spread. While DNA pathogens can be retrieved from millennia-old environmental samples, less stable RNA viruses are usually limited to pathology collections from the last centuries.
To expand the temporal reach of RNA virus research, we targeted naturally dry and cold environments that may facilitate long-term viral RNA preservation.
Recently, our group detected two rotavirus sequences in Adélie penguin (Pygoscelis adeliae) remains from the Ross Sea area of Antarctica, one remain dated to ~ 1,900 years before present. We analyzed 12 additional specimens from the same region and identified further rotavirus-related sequences as well as a partial genome of the Penguin circovirus (PenCV). Ongoing work aims to complete the PenCV genome, further investigate the detected rotavirus, and obtain radiocarbon dates for the newly analyzed samples to inform downstream phylogenetic analyses under clock models.
In parallel, we collected soil in dense bird colonies in Svalbard, Norway, another naturally cold region. Here too, we focus on the detection of historical viral RNA from bird-infecting agents. Analyses of this material are still ongoing.
Overall, these results highlight the potential of naturally frozen specimens as archives of ancient viral

Keywords

`Ancient genomics, Ancient DNA, viral RNA, historical specimens`

Registration ID

`OHS26-0089`

Professional Status of the Speaker

`PhD Student`

Junior Scientist Status

`Yes, I am a Junior Scientist.`

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Session Classification: Coffee & Poster Viewing II

Track Classification: Genomics & Proteomics