University of Alberta
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Tolerating antibiotics

By Brian Murphy August 31, 2011

Researchers drill a permafrost core for ancient DNA studies in Klondike area in the Yukon.

(Edmonton) Diseases with the ability to resist antibiotics are often considered a modern phenomenon, but a University of Alberta researcher specializing in the ice age is part of a Canadian team that is reporting that microbes have been building their defenses to antibiotics since the time of woolly mammoths.

Manufactured antibiotics have been available since the 1940s and many of the targeted, disease-laden microbes have evolved and become drug resistant. One explanation for the chink in the armor of antibiotics is the overuse of common germ-fighting drugs.

“The ancient DNA found in the permafrost shows that these microbes have been battling for survival against natural antibiotics for at least 30,000 years and represents evidence for the evolutionary back-story of the challenges of modern antibacterial resistance,” said Duane Froese, professor in the Department of Earth and Atmospheric Sciences.

Working with colleagues from McMaster University—Gerry Wright, an infectious disease expert, and Hendrik Poinar, a specialist in ancient DNA—Froese has been able to show that antibiotic-resistance genes are present in permafrost deposits from the unglaciated area of the Yukon. The group used a technique known as ancient sedimentary DNA, which involves sampling of ancient sediments and extracting DNA from plants, animals and bacteria when they were laid down thousands of years ago. Froese says the research was focused on the Klondike region of the Yukon because his U of A group had a good understanding of the plants and animals they could expect to find traces of.

Froese and U of A colleague Fabrice Calmels, a post-doctoral research fellow, were able to date the resistant genes because they were found at the same sediment levels in the permafrost as DNA from known Pleistocene animals such mammoths, horses, bison and plant materials found only in the area during last glacial stage, which occurred about 30,000 years ago.

“Our findings question the hypothesis that the emergence of antibiotic resistance is a contemporary issue,” said

Froese." "We've unearthed a rich history of antibiotic resistance and this information could help develop solutions to this aged-old and naturally occurring process."

Froese was a principal investigator on the research project led by McMaster University. The research was published Aug. 31 in the journal Nature.