Fossils provide evolutionary window into how epigenetics works

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By the time the planet transitioned to the current geological epoch, the Holocene, the vast majority of species that lived during the Pleistocene had gone extinct, most likely due to climate change or hunting by humans. Climate change in the Pleistocene was “huge, frequent, and rapid,” says paleontologist Alan Cooper, director of the Australian Centre for Ancient DNA at the University of Adelaide. “Sometimes a change of 10 degrees centigrade over a space of a decade or two.” It’s difficult for animals to cope with such dramatic shifts through standard evolution by natural selection, which often takes decades — even millennia — to spread advantageous genetic mutations and hone adaptations.

Yet, somehow, a few megafauna survived the mercurial Pleistocene, including a few species of bison. Their living descendants, the North American wood and plains bison, are the largest land animals on the continent today. A great puzzle for paleontology is what made the bison so resilient. How was it able to adapt when so many others failed?

Cooper thinks part of the answer lies beneath the Yukon permafrost. With the right techniques, he can pull a secret history from the DNA in the fossils he collects. Their genetic material conceals a dimension of evolution that scientists are just starting to understand, known as epigenetics. Epigenetic mutations are potentially heritable, but, in contrast to genetic mutations, they do not alter DNA sequences. Instead, they manifest themselves in patterns of molecules glued to DNA that help determine which genes are active.

Read full, original post: The Secret, Stressful Stories of Fossils