**Detecting natural selection signal in bat DNA sequences after exposure to white-nose syndrome**

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Two populations with spatio-temporal differences in exposure to a pathogen vary in the response to the infection. With increasing number of lethal cases, the infection imposes a strong selective pressure, which lead to adaptations detectable at the genomic level. Positive selection is defined as *d*N / *d*S > 1, where *d*N represents non‑synonymous substitution rate and *d*S synonymous substitution rate in DNA sequences. Positive selection signal in specific genes with function related to the infection progress provides an insight to the mechanism of disease tolerance or resistance.

We studied white-nose syndrome (WNS), a fungal infection of hibernating bats, that is tolerated by the Palearctic bats, but lethal in multiple Nearctic bat species. Palearctic bats represent populations with historic exposure to the pathogen, and we hypothesized that past selective pressure of the pathogen resulted in genomic changes promoting infection tolerance.

We sequenced selected genes with function in water metabolism and skin structure on the Pacific Biosciences platform. We investigated partial sequences of 23 genes in nine Palearctic and Nearctic hibernating bat species and one non-hibernating species for signal of natural selection in a phylogenetic context. With maximum likelihood analysis, we found that eight genes were under positive selection, and we successfully identified amino acid sites under selection in five encoded proteins. The branch site models revealed positive selection in three genes.

Palearctic bats exhibit signals for positive selection in genes with functions ensuring cell membrane fluidity with changing temperature, tissue regeneration and wound healing, and also modulation of the immune response. We developed a mechanistic model that highlights the importance of skin barrier integrity and healing capacity in the progression of WNS pathophysiology and propose a possibility of downregulation of the immune reaction in response to the *Pseudogymnoascus destructans* infection.